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Journal of the Society of Arts.

FRIDAY, FEBRUARY 19, 1869.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at eight o'clock :—

FRIDAY MORNING, 19TH FEBRUARY (THIS DAY).—The adjourned discussion on Mr. HENRY COLE'S paper, "On the Efficiency and Economy of a National Army, in connection with the Industry and Education of the People," will be opened by Major-General Sir WM. DENISON. A. J. MUNDELLA, Esq., M.P., will take the chair at 11 a.m.

FEBRUARY 24.—"On Ventilation." By EDWARD SMITH, Esq., M.D., F.R.S. On this evening THOMAS BAZLEY, Esq., M.P., will preside.

*** Persons having Models or Plans of Ventilators, or systems of Ventilation, desiring to show them on this occasion are requested to forward them to the Secretary not later than Tuesday next.

MARCH 3.—"On the Adaptation and Extension of Present Means for the Promotion of Scientific Instruction." By H. H. SALES, Esq. On this evening Lord FREDERICK CAVENDISH, M.P., will preside.

MARCH 10.—"On the Screw Propeller." By N. P. BURGH, Esq., C.E.

MARCH 17.—"On the Trade and Commerce of Japan." By WILLIAM DAVISON, Esq.

MARCH 24.—*Passion Week*.—No MEETING.

MARCH 31.—"On Technical Education, considered in relation to Female Schools." By ELLIS A. DAVIDSON, Esq., Lecturer on Science and Art in the City of London Middle Class Schools.

APRIL 7.—"On the Theory of Boiling in connection with some processes in the Useful Arts." By CHARLES TOMLINSON, Esq., F.R.S., F.C.S.

CANTOR LECTURES.

The concluding lecture of the Course of Four Lectures, "On Painting," will be delivered by S. A. HART, Esq., R.A., late Professor of Painting at the Royal Academy, as follows :—

LECTURE IV.—MONDAY, FEBRUARY 22ND.

On Landscape Painting.

The lecture will begin at eight o'clock. These Lectures are open to Members, each of whom has the privilege of introducing two friends to each lecture. Tickets for this purpose have been forwarded to each member.

FINAL EXAMINATIONS, 1869.

In order to avoid holding these Examinations on the same evenings as those of the Department of Science and Art, it has been decided to hold them, in 1869, on the evenings of

TUESDAY, the 20th APRIL,
WEDNESDAY, the 21st ,"
THURSDAY, the 22nd ,"
FRIDAY, the 23rd ,"

From 7 p.m. to 10 p.m., instead of on the 27th, 28th, 29th, and 30th April, as announced in the Programme of Examinations for 1869.

In consequence of this alteration the Previous Examinations must be held earlier, and the Forms No. 2 and No. 4, referred to in par. 6 of the Programme, must of course be sent in a week earlier than the dates there fixed for receiving them.

It is very important that this alteration should be made as public as possible. For this purpose a number of small slips, to be inserted between pages 8 and 9 of every Programme sent out, have been forwarded to each Institution and Local Board. Large bills, to be suspended on the walls of the Institution reading-room, or in some other public place, will also be sent on application.

In reference to the subjects referred to in the notice at page 9 of the Programme, a sufficient number of applications from candidates in Conic Sections, Navigation and Nautical Astronomy, and Mining and Metallurgy, have already been received. Papers will therefore be set in these subjects.

No paper will be set in Italian.

Local Boards having candidates either in the "Theory of Music" or in "Elementary Musical Composition (Tonic Sol-fa System)," should communicate with the Secretary of the Society of Arts without delay.

ELEMENTARY EXAMINATIONS, 1869.

Secretaries of District Unions and Local Boards desiring to adopt the Society's scheme of Elementary Examinations, are reminded that they must apply to the Secretary of the Society of Arts *without delay*, stating the number of male and female Candidates respectively desiring to be examined in each grade.

FREE LIBRARIES AND MUSEUMS.

The Council have appointed a Committee to consider and report how the Society may aid in promoting the establishment of Free Libraries and Museums of Science and Art throughout the United Kingdom.

THE THAMES EMBANKMENT.

The Council have appointed a Committee to report upon the best way of dealing with the Thames Embankment, so that the opportunity may not be lost of making this noble site conducive to the embellishment and improvement of the metropolis.

SUBSCRIPTIONS.

The Christmas subscriptions are due, and should be forwarded by cheque or Post-office order, crossed "Coutts and Co.," and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

INSTITUTIONS.

The following Institution has been received into Union since the last announcement:—

Keswick, Mechanics' Institution.

Proceedings of the Society.

CANTOR LECTURES.

The third lecture of the course by Mr. S. A. Hart, R.A., "On Painting," was delivered on Monday evening, the 15th inst., the subject being "The Suggestions offered by surrounding circumstances to the Artist." An outline of these lectures will appear in the *Journal* at an early opportunity.

COMMITTEE ON INDIA.

This Committee met on Tuesday, the 16th instant, at 4 o'clock. Present:—Major General Sir Vincent Eyre, K.C.-I., in the chair, Sir Daniel Cooper, Bart., Major-General Sir Wm. Denison, Dr. Archibald Campbell, Messrs. Hyde Clarke, and C. H. Fielder.

The Committee resolved to recommend to the Council a list of other gentlemen interested in Indian matters who should be invited to join the Committee.

The Committee resolved that Six Conferences should be held during the present Session for the discussion of the following subjects, viz.:—

Tea Cultivation in India.

Hill Settlements and Sanitaria.

Waste Lands in India.

Trade with Central Asia, Thibet, and South-Western China.

Indian Fibres.

Silk Cultivation and Supply.

The following evenings were fixed for holding the conferences:—

Friday, March 12th.

" April 2nd.

" April 16th.

" April 30th.

" May 14th.

" May 28th.

At these Meetings the chair will be taken at 8 o'clock, and the discussion will be opened by a paper.

On the first evening, March the 12th, Mr. C. H. FIELDER will open the discussion with a paper "On Tea Cultivation in India."

The subjects for each subsequent evening will be previously announced in the *Journal*.

Members of the Society interested in Indian questions are invited to attend.

ELEVENTH ORDINARY MEETING.

Wednesday, February 17th, 1869; A. J. MUNDELLA, Esq., M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Dermer, Edward C., 3, Barnes-villas, Barnes, S.W.

Fentiman, John W., Devonshire-cottage, Balham, S.W.

Gassiot, John P., jun., 6, Sussex-place, Regent's-park, N.W.

Harrison, Peter, Keswick.

Helme, Robert, The Forest, Walthamstow, N.E.

Hoccombe, James B., 13, Bedford-row, W.C.

Hyam, Frederick, 109, Westbourne-terrace, W.

Leslie, Francis Simon, Ealing, W.

Lloyd, Frederick George, The Winns, Walthamstow, N.E.

Matthews, George Kelly, St. John's-lodge, Beckenham, Kent.

Maunder, Colonel Francis Cornwallis, 75, Onslow-square, S.W., and Army and Navy Club.

Robertson, William Wybrow, 1, Whitehall, S.W.

Williams, Morgan B., 15, Hyde-park-gate, Kensington-gore, W.

The following candidates were balloted for, and duly elected members of the Society:—

Anderson, John, 11, Carnmoney-street, Belfast.

Edwards, Henry Arthur, 132, Upper Thames-street, E.C.

Hunt, Charles, the London Gas Light Company, Nine Elms, S.W.

The Paper read was—

ON THE EFFICIENCY AND ECONOMY OF A NATIONAL ARMY, IN CONNECTION WITH THE INDUSTRY AND EDUCATION OF THE PEOPLE.

By HENRY COLE, ESQ., C.B.

1. Notwithstanding the advancing civilisation throughout the world, the increasing communications of one country with one another, the extension of free-trade, and the spread of Christianity, it must be admitted that nations still require armies and navies to protect their Industry, their Arts, Manufactures, and Commerce. I am therefore desirous, at the outset of these observations, to guard myself against the imputation that I advocate the weakening, much less the abolition, of our country's defences. On the contrary, I desire to see greatly-increased efficiency in our military organisation, and I believe this is not only compatible with, but that it can only be secured through, greatly reduced expenditure. The adoption of a complete change in our present military system, which shall connect it—I may say re-connect it, as in old times, not the least glorious in the history of England—with the interests and occupations of the whole people, appears to me as necessary, for its own sake as for economy's and efficiency's sake. It is a common fallacy, urged by advocates of the present costly system, to argue that, considering the enormous value of our exports and imports—say, in round numbers, something like four hundred and fifty-five millions of pounds a year, which was the amount in 1867—the insurance is cheap at about $5\frac{1}{2}$ per cent., which is the proportionate cost of our annual military and naval expenditure. Last year it amounted to twenty-six millions, *i.e.*, about £15,000,000 for the army, and only £11,000,000 for the work at sea. Such a charge, even if necessary, is in itself wholly unproductive.

2. And it is said that it is good political economy to effect this insurance through the agency of a special class forming a large standing army, which employs rather than rejects the scum of our population. I deny that the amount of £15,000,000 a year is at all necessary. I assert that at least half is an unnecessary expenditure, and therefore a tax upon industry. I repudiate the idea, and it is only a modern one, not much more than a century old, that our soldiers should be a distinct caste, formed by hiring for the most part the outcasts and roughs of the people. On the contrary, I say our private soldiers ought to be able to read and write, as well as Prussian and Swiss soldiers, and, if you like it, to be as devout, going into battle with their Bibles, as our

ancestors did under Cromwell. In the progress of the times I am sure, if you don't have them educated and civilised soldiers, England will be distanced in its race with other nations wiser than ourselves.

3. I shall attempt to show that the country may have a more efficient army than at present at about half the present annual cost, leaving about seven millions either in the pockets of the taxpayer, or to be appropriated to national objects more productive than war, such as the education of the people, and the promotion of those things that advance Arts, Manufactures, and Commerce. I venture to say that even warlike training and expenditure may be usefully connected with the health and occupations of the people; may be a great assistance to the labour market and civil service of the country, rather than a drag upon them, and be made to elevate the national character. With this aim, I hope that the subject is worthy of serious investigation, especially at the present time, and by this Society, which, like the army itself, has nothing to do with party politics. But as a political question I agree with Blackstone, from whose "Commentaries" I have extracted a few passages, which will be found in the appendix. This old Conservative judge says, "The laws and constitution of these kingdoms know no such state as that of a perpetual standing soldier bred up to no other profession than that of war."

4. The subject of military organisation has almost fathomless details, but I do not propose to discuss them. My paper is intended to deal only with broad principles, and will avoid details except they may touch my argument. I do not propose to enter upon the numberless vexed questions connected with the army administration, which army reformers are discussing. For those who wish to go into this subject I refer them to the numerous pamphlets of the day. I will not stay to inquire why purchase of promotion should not be adopted in all the branches of the army, if in some, and those which require high scientific attainments like Engineers and Artillery, or various practical work, like the Marines, and why it is applied only to those branches of the cavalry and infantry which demand inferior attainments, and where the duties in the time of peace are so light, that they only employ a subaltern one hour in the day, leaving him the remaining twenty-three hours for dress, meals, sports, and pleasure. I do not stay to ask what is the reason why there should be purchase in the army and not in the navy; or to ask why the British army requires one officer to every twenty-eight men, such officer depending upon a serjeant virtually to do his duties, whilst the French army has only one officer to thirty-three men, and makes him do his work himself; and whilst Prussia requires only one officer to forty-nine men. I will not discuss the system of recruiting, as people generally now agree with the late Sidney Herbert, afterwards Lord Herbert, who said recruiting for men to defend the honour of the country was done "by every kind of cajoling and inducement we can devise, and in our necessity we descend to those means which men do not have recourse to till they think all others are exhausted;" or with Sir Charles Trevelyan, who truly writes that "Our pot-house system of recruiting, the soldier's long term of service, and the restrictions upon his marriage, act as a direct encouragement to drunkenness and debauchery in a great national establishment which might, under different arrangements, be converted into a popular training-school of the highest intellectual and moral value." I entreat the meeting to abstain from discussing these topics. I will not ask why half-pay for a whole life be necessary for the hard work which many officers undergo—that of only one hour a-day for a few years. I will not investigate the whimsical paradox by which railway engineers, untrained as soldiers, are made colonels, with military rank, whilst officers of Royal Engineers, thoroughly trained, are compelled to resign the army if employed in civil service for more than ten years. I will not say whether or not it is better to have one military school or many; whether or not an enormous centre for

all military stores is cheaper and better than regimental management of them; whether or not there should be Government manufactories; whether or not military men alone ought to be sole judges of scientific and mechanical inventions; whether or not the progress of practical science, and its effect upon warfare, be sufficiently appreciated by our English military authorities; whether or not, in these days, when every year seems to add a mile to the range of great guns, it is good sense to spend millions upon enlarging the area of fortifications. Nor will I discuss what is called the "dual" system of government by Horse Guards and Pall-mall. All these are questions of administration, and there are many others of a like sort, any one of which is of sufficient importance to be discussed separately if the present system is to be maintained, but, as I advocate a thorough change of system, and would shut up the present one as soon as possible, I pass them by.

5. Let me say, once for all, that I consider the management of the army in India quite a distinct subject from the army for the United Kingdom and its other dependencies. Whether we employ too many soldiers there or not, whether or not the service in India should be connected with the whole army, whether or not India should be treated as a real military training school for the United Kingdom, are questions, too, which I pass by; but this I will venture to say, that the cost of the Indian army, be it little or much, ought not to be charged upon the taxpayer of this country, but should be supported by India, whatever that cost may be.

6. Putting, therefore, aside merely administrative details, and leaving the case of India out of consideration, then I come to our home army in its present state. We had last year a standing army of about 125,000 men, besides about 130,000 militia and yeomanry, and 150,000 volunteers; of this force, exclusive of militia, &c., I calculate that about 40,000 were distributed over the colonies. But the size of this great standing force is not to be defended on the ground of its efficiency; and many of the highest military authorities frankly admit that it is most imperfectly organised for immediate action when war arises. Our officers and men, I believe, are unrivalled for their enduring pluck, and make the noblest soldiers in the world; but at the beginning of a campaign they have to learn their work, and struggle into efficiency, with much suffering, through a long apprenticeship, and at enormous cost to the tax-payer. I need only allude for illustration to the latest instance, the Crimean war. On that occasion we left off in good fighting condition, but we began the work as badly as possible in respect of the administrative branches. Major Edwards, R.E., in his lecture on the organisation for the army of England, says:—"Any one who considers the present organisation of our army cannot but feel surprise and astonishment that the country should for so long a time have submitted to an enormous extra expenditure in time of war for want of organisation and a proper proportion between the services in time of peace. We know how the army suffered in the sieges during the Peninsular war for want of a sufficient engineer corps and siege train. If the infantry had been 3,000 or 4,000 less, and the engineers and artillery increased by that number of trained men, what a loss of life would have been saved! We need only go back to the army in the Crimea, with its inadequate force of engineers, and without any military train, to see how differently it would have been situated had only 1,500 of the infantry been trained sappers, and 2,000 employed as military train. It was well known before the Crimea that railroads would play an important part in future wars, and consequently the engineers of our army should have been trained in their construction and use. The 1,500 additional sappers might have been used as infantry if required, but employed in their legitimate occupation, they would have saved the great expense of the army

works corps, and have made a tramway or light railway from Balacava almost to the front before the army began to die from starvation and exposure. What would not a military train 2,000 strong have done towards saving our army from destruction? Under these circumstances I think we may come to the conclusion that it would have been better to have had 3,500 less infantry in the Crimea, and to have employed this body of men in the above-mentioned manner, as they would have saved the remainder from destruction. We are now very little better off than we were during the Crimean war; we have a larger force of field artillery, and a small body of military train, but if we were to put 30,000 men into the field to-morrow, we could not undertake any operations a few marches away from our ships." I don't think even our late success in Abyssinia qualifies my assertion. That costly enterprise—for it cost nearer nine than five millions—and five only have been voted—was rather a scientific operation, fortunately confided to an able man of science, a military engineer, and, for the first time in our military annals, I believe, an engineer officer was entrusted with supreme military command. He was an Indian officer who had gained his position by hard work, rather than by purchasing promotion. On the contrary, I believe that instead of our present large costly standing army—not nearly large enough in case of war—imperfectly organised—our true policy to secure efficiency would be to have the smallest possible standing force, capable of indefinite and instantaneous extension when necessity arises. War, now, with science and railways, is a word and a blow, and the victory will be with those who are ready first with the greatest numbers and the best arms.

7. I am assured that the experience gained in the late Prussian war has proved that the best number for a *Corps d'Armée* is about 16,000 men properly organised, with its due proportions of engineers, artillery, commissariat, hospital staff, cavalry, and infantry. Instead of compact bodies of troops capable of acting together at an hour's call, we have to extemporise all the necessary organisation when war arises—and our professed military organisation I am afraid proves a sham and a delusion. I believe one such real *Corps d'Armée* of 16,000 men would suffice as a model for the United Kingdom, together with an ample reserve of efficient officers, engineers, artillerymen, marines, hospital staff, and all those divisions of an army which cannot be extemporised off-hand.

8. We do not want soldiers in the United Kingdom to act as policemen. Since the Duke of Wellington's campaigns we have substituted in the metropolis, for the old Charley watchmen and a few Bow-street runners, local armies of civil policemen, numbering about nine thousand trained men at the present time, and yet, as in the days of no police, we still keep large bodies of troops in the metropolis. Cavalry still remain in vile barracks at Hyde Park (where the officers' quarters have a pleasant look-out on the girls of the period in Hyde Park, and are certainly very handy for London evening parties), and we ignore the fact that special constables are easily made, and that the telegraphs and the railways could bring troops to London in half-an-hour, in case of any tumult which the police might be unable to suppress. Every county, too, has organized its own police, and Ireland has a police force of many thousands of loyal and effective men, better than soldiers for their purpose. But our home army has gone on increasing, whilst we have, at the same time, created civil armies of police by thousands.

9. But then it will be asked, if you reduce the standing army what is to become of our colonies? Our colonies are of different kinds. Some are communities having constitutional governments of their own, like Australia and Canada, which will rival us in population soon; others, like the Cape of Good Hope, Malta and Gibraltar, are military stations; others, like the West Indies, are places held in subjection, and require military

forces to hold them. Australia and Canada, and the like, which regulate their own taxation, ought to be no charge on the tax-payer of this country; and I venture to submit that all imperial troops should be withdrawn from such colonies, except, perhaps, some few engineers and artillerymen. At military stations like Gibraltar, so long as it is considered to be policy to hold them, of course we must keep troops, but let them be as few as possible. Steam transports supersede the necessity for large depôts of men in time of peace, eating the bread of idleness.

10. At the present time, wars, although settled quickly, do not come on like a thief in the night, without previous notice. Thank God, the press keeps us all, even diplomacy itself, well informed if a nation is going to quarrel with us and threaten war. We have at least some time to make warlike preparations; and enthusiasts even dream of an international convention, to which all civilized nations may be parties, which shall agree that no nation shall make war upon another without giving due and ample notice for preparation.

11. Let us have at once perfect telegraphic communication with all our possessions and colonies, so that we may receive instantaneous notice of a call for the assistance of the mother country. I marvel at the blindness of governments which have not yet seen the imperative necessity for an electric telegraph under our own control to India. No cost of failures is worth estimating against the value of a means of hourly communication with India. Whatever be the cost, a British telegraph to India should be laid in the shortest possible period of time. Here, at least, is one subject where the military interests go hand in hand with those of Arts, Manufactures, and Commerce.

12. I now pass to the consideration of what our new military organisation might be, to enable us to defend the honour of the country efficiently and cheaply. It is common to say that England is not a military nation. I say she ought to be a military nation, and that she has the means of being so beyond all other nations; and I believe we shall be less pugnacious, when we are all soldiers, than when we have a caste whose special interest is fighting. Little Switzerland has an analogy with England. Switzerland is circumscribed with mountains, whilst England is bounded within fixed limits with water. Yet Switzerland, having the most military nations on all her frontiers, with only a population of some two millions, has always held her own against them. But then, Switzerland has every thirteenth soul of her population a soldier capable of bearing arms, an army of about 340,000 always ready for her defence in case of need. But Switzerland has no paupers, and every Swiss child is compelled to read and write. Odious compulsion! And the cost to the government of Switzerland of her military defence is stated to be a miserable sum of only about £150,000 a-year, or less than 10s. a man. I will not trouble the meeting with statistics from Prussia and Austria, which teach us a lesson, but I shall append to this paper some extracts from Mr. Martin's "Statesman's Year-book for 1869," to which I invite attention.

13. I have no hopes of having such an economical arrangement as the Swiss, but I do ask why England, at a reasonable cost, cannot have one in thirteen of her 30,000,000 population trained to bear arms in defence of her honour, her Arts, Manufactures, and Commerce in connection with them, and being no drag upon them? I trust my countrymen will seriously ask themselves this question. It may be said that except to guard the successor of St. Peter, the Pope, Switzerland only concerns herself with her own territory, whereas we have all the world to look after. That very fact all the more confirms me in the belief that we ought to have millions of men ready to come forward when required. No nation has such a field for military practice as England has in India. We ought to be able to supply India with British troops without difficulty, and without cost to the

home taxpayer, if the organisation, the pay, and the period of service were well arranged. We have difficulties with our present standing army of 130,000 men, but we should have much fewer and perhaps none with three millions of trained men. The proper training of three millions of men, which, according to the scale of Switzerland ought not to cost the state two millions a year, would be no weight upon the industry of the country. It might be even a benefit to it. This sounds paradoxical, but it is not so. The industry of little Switzerland is not damaged by its training of one in thirteen of its population, nor would be the industry of the United Kingdom. How, then, is it to be done?

14. I would begin by making drill part of national education in every boys' school in the country. At a very moderate cost, the military pensioners might be profitably employed to drill every school once in the week. No one will say that this drill would not improve the health and bearing of the boys, or assert that it would damage them as ploughboys or factory hands. It would also instil a military spirit into them.

15. When the lad leaves school every inducement should be given to them to elect between becoming volunteers or joining the militia, not the present, but a reformed system of militia. Common cause should be made with all the great employers of labour, not only to allow, but to encourage their hands to keep up the drill and advance it. Call out the volunteers and militia once in the year for twenty days or so, and then return them to their occupations. Throughout the United Kingdom there should be drill from April to October, and your idle half-pay officers should be turned into full-pay, to command the men. Make another proportion of men of a certain age soldiers for twelve months at proper wages, and then return them to their occupations afterwards. I refer my hearers to an excellent article on this subject, published in the *Pall Mall Budget*, of December 4th. I quote only one short passage. "At the present time public opinion is, we trust, tending strongly towards the creation of a more national army—or, we should say, a more national military system—than that which exists at present. We want to obtain a better class of men, more of them, on better terms, and to pass them more rapidly through the military mill; to be thereafter engaged on their ordinary avocations, while available for some few years on an emergency for military service." I have consulted several large employers of labour in the North of England, and they all assure me that some such system would in no way interfere with the labour market and the operations of labour, but greatly benefit them both. Such a system is something quite different from taking a bad man for twelve years as a soldier, and then returning him to the labour market with a pension. Soldiers should thus be made in the midst of their industrial occupations. They should form part of the civil service of the country. Among the very best civil servants are officers and men of the Royal Engineers. Whether for officers or privates, you know with certainty that you can obtain a competent man for almost any kind of work in the Royal Engineers; and, this being so, why should not there be the same kind of certainty for obtaining civil servants in all other branches of the army? I am assured by high military authorities that twelve months is amply sufficient to make first-rate disciplined private soldiers, and that more time than this is thrown away. Of course, if you want men to march like machines, life is not long enough to accomplish it perfectly; but this old world dandyism is less cultivated by other nations, and is probably thrown aside on the field of battle.

16. I hope to see the military service thoroughly fused with the civil service of the country, and that one test of qualification for entering the civil service should be a certificate for having served well as a volunteer, militia-man, or soldier, retired from active service. The French even are adopting this principle. A report of Marshal

Niel, dated the 23rd of January, 1869, has been addressed to the Emperor of the French, proposing that measures should be taken granting facilities to re-enlisted non-commissioned officers to pass from the military into the civil service of the State. The report concludes by saying that such measures would give to the lower military grades a greater attraction, and serve as a stimulant, which could not fail to produce an excellent effect throughout the army, and realize within a short time the benevolent intentions of the Emperor.

Again I quote old Judge Blackstone. "The military power should not be a body too distinct from the people. It should be wholly composed of natural subjects; it ought only to be enlisted for a short and limited time. The soldiers also should live intermixed with the people; no separate camp, no barracks, no inland fortresses should be allowed. And, perhaps, it might be still better if, by dismissing a stated number and enlisting others at every renewal of their term, a circulation should be kept up between the army and the people, and the citizen and the soldier be more intimately connected together."

Sir Charles Trevelyan, in his able pamphlet, "The British Army," says:—"The object to be aimed at is to make the army a true representation of the nation. It should be neither more aristocratic nor more democratic than the rest of English society. The upper, the middle and the lower classes cordially co-operate in every other public and private undertaking, and why should the army be the solitary exception? Since the beginning of the century the middle class has enormously developed; the present flourishing state of the country is chiefly owing to their exertions; and they have twice within the same period shown, by voluntarily organising for the national defence, that they do not yield to any portion of the community in military spirit and capacity. When this class, taken in its widest sense, shall be included, our army will come up to the full standard of the strength, the intelligence, and the moral qualities of our population; and, from being in its plan and design a purely aristocratic institution, the British army will become emphatically a popular army, and our recruiting difficulties will be at an end.

"The rapidity with which militia regiments have improved after they have been embodied shows that the year's previous training, followed by a week or ten days' annual exercise, would give us the fruit of all our expenditure of time and money—an efficient, reliable militia—which cannot be obtained by any number of repetitions of the existing annual exercises. Our able-bodied youth would be economised and turned to the best account, because the year from eighteen to nineteen is the one which can best be spared in the life of a young man, standing, as he then does, on the edge of the labour market, without having taken up his place in it; and this year spent under discipline and instruction at the militia head-quarters would be well spent, even in reference to success in civil life. Those who have not completed their elementary education should be required to attend the regimental school until they come up to a prescribed standard; and the library and reading-room, and the lectures given by the military instructor and volunteer lecturers, should be open to all. Every militia head-quarters would become a military school, like those which have been established by the Government of Canada at several towns, under officers of the regular army, at which candidates for commissions in their militia are trained until they pass a certain examination, more or less strict according to their rank. Our provincial military schools, however, would be more efficient than those of Canada, because, being based upon a small but permanently embodied military force, they would combine practical with theoretical instruction; and once every year the entire regiment might be called out for brigade and division manoeuvres with the other troops of the district. Instead of the holiday displays, which are not self-supporting, even for a single day, got

up by collecting volunteer regiments from distant parts of the country, the volunteers included in each military division would assemble for their annual exercise with the local line, militia, and yeomanry regiments, and they would all be supported by the local military and administrative staff, so that the troops which might have to serve together in war would acquire the habit of acting together under circumstances most resembling those of war; and as not merely the combatant ranks, but the entire military machine, would be periodically seen in actual operation, defects would be remedied without loss or discredit, which, in the face of an enemy, might involve untold sacrifices."

Many of these suggestions are well worked out by Col. Leahy, R.E., in his able paper on "Army Organization."

17. As respects engagement for longer terms—say seven years in India or more—that would be met by a special class, who would look to military service as the sole business of their lives, and the rate of payment would be regulated by the rate of wages and the necessities of the case. So in time of actual foreign war men would be engaged and paid liberally, and, if wounded, pensioned. If not wounded they would return to their occupations.

18. The Parliamentary votes for the army in 1868 were £15,455,000. This is exclusive of the cost of the army in India. This enormous sum was apportioned as follows:—

No. 1. Regular forces	£ 8,691,500
No. 2. Reserved forces	1,524,500
No. 3. Stores	1,491,400
No. 4. Works and buildings	968,400
No. 5. Military education, surveys, administration, &c.	655,200
Total effective service	13,331,000
No. 6. Non-effective services, pensions, &c.	2,124,400
Total of effective and non-effective.	15,455,400

19. My conviction is, that about seven millions of pounds sterling would be saved annually by the adoption of principles such as those I have briefly glanced at, and the future apportionment of Parliamentary votes might, I submit, without pledging myself to precise details, which are far too many for public discussion, be somewhat as follows:—

Standing army, 16,000 men at £65 a-piece . .	£ 1,040,000
Scientific reserves of Engineers, Artillery, Marines, Hospital Corps, Staff officers, &c., say 30,360 men, being an increase on the present force, at £65 per man	1,950,000
Militia, and drilling of youths from 10 years old and upwards	2,000,000
Volunteers	1,000,000
Colonial corps	500,000
Stores	1,000,000
Works and buildings, excluding new fortifications	500,000
Pensions	600,000
Civil administration	150,000
	8,740,000

20. The feasibility of all this depends upon a real public desire to save annually seven or eight millions of unproductive expenditure, and, in return, to be willing to become home soldiers universally; foreign service being paid for at its proper value. Such a reform like this is not to be accomplished by a stroke of the pen. It could only be effected by slow degrees. But if the principles I advocate were adopted by the public, I think the new system might be fully introduced in the course of seven years, each year during the process witnessing a sensible reduction of expenditure, until the total cost reached the sum I have mentioned.

21. When war came we should be far readier for action

than we have been hitherto. An unproductive annual expenditure of seven millions would have been economised, enabling us to bear the additional cost of the trumpets, drums, and fifes of actual war.

22. Allow me to glance at what a saving of seven millions a-year would accomplish for Arts, Manufactures, and Commerce. It would provide a national system of education. It would provide scientific and technical instruction, through colleges, schools, and museums, throughout the United Kingdom, wherever the wants of the country required them. It would establish complete electric telegraphs between the United Kingdom and the whole of our colonies and dependencies. It would enable us to abolish all taxes on locomotion. It would reduce the postage to all colonies and dependencies. It would relieve, if not abolish, many taxes on production, and help to give the people a free breakfast-table. It would help in abolishing pauperism.

23. And whilst these positive results to Arts, Manufactures, and Commerce could be predicted as certain, the better organization of military service would directly benefit them instead of being a wholly unproductive dead weight.

24. I hope to see all friends of peace assisting in this reform. It is the work rather of civil administration than for the heroes of warfare. The measure, I know, cannot be acceptable to military prejudices and to many of the military officers, who constitute a sixth part of the present House of Commons. But the press is discussing the subject most ably, and the pamphleteers on army reform are many. I venture to call particular attention to the masterly articles which from time to time appear in the *Pall Mall Gazette*, the *Saturday Review*, the *Times*, and other journals; and if the matter be as well discussed in Parliament as in the press, the national will, and the country at large, which pays for the defence of its honour and interests, will soon be the best judge of what is necessary for them. It may be a fight against narrow, short-sighted prejudices, to last as long as those against Catholic Emancipation, the Test and Corporation Acts, Parliamentary Reform, Municipal Reform, Railways, Corn-laws, and Free-trade. But these beneficial changes have become the creed of all men in my time, and I trust to live to see the honour of the country placed in the custody of a national army.

APPENDIX.—A.

Blackstone on Standing Armies.

In a land of liberty it is extremely dangerous to make a distinct order of the profession of arms. In absolute monarchies this is necessary for the safety of the prince, and arises from the main principle of their constitution, which is that of governing by fear; but in free states the profession of a soldier taken singly and merely as a profession, is justly an object of jealousy. In these no man should take up arms, but with a view to defend his country and its laws: he puts not off the citizen when he enters the camp; but it is because he is a citizen, and would wish to continue so, that he makes himself for a while a soldier. The laws therefore and constitution of these kingdoms know no such state as that of a perpetual standing soldier, bred up to no other profession than that of war: and it was not till the reign of Henry VII. that the kings of England had so much as a guard about their persons.

It seems universally agreed by all historians, that King Alfred first settled a national militia in this kingdom, and by his prudent discipline made all the subjects of his dominion soldiers; but we are unfortunately left in the dark as to the particulars of this his so celebrated regulation.

For every knight's fee a knight or soldier, *miles*, was bound to attend the king in his wars, for forty days in a

year; in which space of time, before war was reduced to a science, the campaign was generally finished, and a kingdom either conquered or victorious. By this means the king had, without any expense, an army of sixty thousand men always ready at his command. . . . This personal service in process of time degenerated into pecuniary commutations or aids, and at last the military part of the feudal system was abolished at the restoration, by statute 12 Car. II. c. 24.

In the mean time we are not to imagine that the kingdom was left wholly without defence in case of domestic insurrections, or the prospect of foreign invasions. Besides those who by their military tenures were bound to perform forty days' service in the field, first the assize of arms, enacted 27 Henry II., and after the statute of Winchester, under Edward I. obliged every man, according to his estate and degree, to provide a determinate quantity of such arms as were then in use, in order to keep the peace: and constables were appointed in all hundreds by the latter statute, to see that such arms were provided. These weapons were changed by the statute 4 & 5 Ph. & M. c. 2, into others of more modern service; but both this and the former provisions were repealed in the reign of James I. While these continued in force, it was usual from time to time for our princes to issue commissions of array, and send into every county officers in whom they could confide to muster and array (or set in military order) the inhabitants of every district; and the form of the commission of array was settled in parliament in the 5 Hen. IV., so as to prevent the insertion therein of any new penal clauses. But it was also provided, that no man should be compelled to go out of the kingdom at any rate, nor out of his shire but in cases of urgent necessity; nor should provide soldiers unless by consent of parliament. About the reign of King Henry VIII., or his children, lieutenants began to be introduced, as standing representatives of the crown, to keep the counties in military order, for we find them mentioned as known officers in the statute 4 & 5 Ph. & M. c. 3, though they had not been then long in use, for Camden speaks of them in the time of Queen Elizabeth, as extraordinary magistrates constituted only in times of difficulty and danger; but the introduction of these commissions of lieutenancy, which contained in substance the same powers as the old commissions of array, caused the latter to fall into disuse.

In this state things continued, till the repeal of the statute of armour in the reign of King James the first: after which, when King Charles the first had, during his northern expeditions, issued commissions of lieutenancy, and exerted some military powers which, having been long exercised, were thought to belong to the crown, it became a question in the long parliament, how far the power of the militia did inherently reside in the king; being now unsupported by any statute, and founded only upon immemorial usage. This question, long agitated with great heat and resentment on both sides, became at length the immediate cause of the fatal rupture between the king and his parliament: the two houses not only denying this prerogative of the crown, the legality of which perhaps might be somewhat doubtful: but also seizing into their own hands the entire power of the militia, the illegality of which step could never be any doubt at all.

Soon after the restoration of King Charles the second, when the military tenures were abolished, it was thought proper to ascertain the power of the militia, to recognise the sole right of the crown to govern and command them, and to put the whole into a more regular method of military subordination; and the order in which the militia now stands by law is principally built upon the statutes which were then enacted. It is true the two last of them are apparently repealed; but many of their provisions are re-enacted, with the addition of some new regulations, by the present militia laws; the general scheme of which is to discipline a certain number of the inhabitants of every county, chosen by lot for three

years, and officered by the lord lieutenant, the deputy lieutenants, and other principal landholders, under a commission from the crown. They are not compellable to march out of their counties, unless in case of invasion or actual rebellion within the realm (or any of its dominions or territories), nor in any case compellable to march out of the kingdom. They are to be exercised at stated times: and their discipline in general is liberal and easy; but, when drawn out into actual service, they are subject to the rigours of martial law, as necessary to keep them in order. This is the constitutional security which our laws have provided for the public peace, and for protecting the realm against foreign or domestic violence.

When the nation was engaged in war, more veteran troops and more regular discipline were esteemed to be necessary, than could be expected from a mere militia. And therefore at such times more rigorous methods were put in use for the raising of armies, and the due regulation and discipline of the soldiery: which are to be looked upon only as temporary excrescences bred out of the distemper of the state, and not as any part of the permanent and perpetual laws of the kingdom. For martial law, which is built upon no settled principles, but is entirely arbitrary in its decisions, is, as Sir Matthew Hale observes, in truth and reality no law, but something indulged, rather than allowed as a law.

But, as the fashion of keeping standing armies (which was first introduced by Charles VII. in France, A.D. 1445) has of late years universally prevailed over Europe (though some of its potentates, being unable themselves to maintain them, are obliged to have recourse to richer powers, and receive subsidiary pensions for that purpose), it has also for many years past been annually judged necessary by our legislature, for the safety of the kingdom, the defence of the possessions of the crown of Great Britain, and the preservation of the balance of power in Europe, to maintain even in time of peace a standing body of troops, under the command of the crown; who are however *ipso facto* disbanded at the expiration of every year, unless continued by parliament. And it was enacted by statute 10 W. III. c. 1, that not more than twelve thousand regular forces should be kept on foot in Ireland, though paid at the charge of that kingdom; which permission is extended by statute 8 Geo. III. c. 13, to 16,235 men in time of peace.

To prevent the executive power from being able to oppress, says Baron Montesquieu, it is requisite that the armies with which it is entrusted should consist of the people, and have the same spirit with the people; as was the case at Rome till Marius new-modelled the legions by enlisting the rabble of Italy, and laid the foundation of all the military tyranny that ensued. Nothing then, according to these principles, ought to be more guarded against in a free state, than making the military power, when such a one is necessary to be kept on foot, a body too distinct from the people. Like ours, it should wholly be composed of natural subjects; it ought only to be enlisted for a short and limited time; the soldiers also should live intermixed with the people; no separate camp, no barracks, no inland fortresses should be allowed. And perhaps it might be still better, if, by dismissing a stated number and enlisting others at every renewal of their term, a circulation should be kept up between the army and the people, and the citizen and the soldier be more intimately connected together.

APPENDIX.—B.

Extracts from Martin's "Statesman, for 1869."

THE PRUSSIAN ARMY.

The military organisation of the kingdom, dating from the year 1814, is based on the principle that every man, capable of bearing arms, shall receive military instruction and enter the army for a certain number of years. There

are, practically, some exceptions from military service, though no substitution whatever is allowed. Every Prussian subject is enrolled as a soldier as soon as he has completed his twentieth year. He has to be in service during seven years, of which three years—from 20 to 23—must be spent in the regular army, and the remaining four years—from 23 to 27—in the army of reserve. At the end of this term the soldier enters the "Landwehr," or militia, for nine years, with liability to be called upon for annual practice, and to be incorporated in the regular army in time of war. Leaving the "Landwehr," the soldier is finally enrolled, till the age of fifty, in the "Landsturm," which body is only called upon for service, within the frontiers of the country, in case of invasion. There are various exemptions from this law of military service, in favour of the nobility, clergy, and some other classes of the population. A certain amount of education and fortune constitutes also a partial exemption, inasmuch as young men of twenty who pay for their own equipment and can pass a light examination, have to serve only one year in the regular army, instead of three. But in this case, the liability to service in the army of reserve—the "Landwehr" and the "Landsturm"—remains the same. Altogether, setting aside a few exceptions, the whole male population of Prussia may be said to be trained for arms—ready for offensive warfare, either in the army or the "Landwehr," from the age of 20 to 36; and for defensive warfare, within the country, till the age of 50.

The mass of soldiers thus raised is divided into companies, battalions, regiments, and corps d'armée. The strength of a Prussian battalion in peace is 518 men, raised in war to 1,002 by calling in part of the reserves: it is divided into four companies, each of which in war consists of 250 men. During peace each regiment of infantry consists of three battalions; each brigade of two regiments; each infantry division of two brigades, to which, under the command of the divisional general, four squadrons of cavalry, four batteries of artillery, each of six guns, and either a battalion of riflemen, or a battalion of pioneers are attached. The corps d'armée is considered a unit which is independent in itself, and includes not only troops of all three arms, but a portion of all the stores and appliances which are required by a whole army. Each corps d'armée consists of two divisions of infantry, a cavalry division of four regiments, with two horse artillery batteries attached, besides the two cavalry regiments attached to the infantry divisions, and a reserve of artillery of four field batteries and two mounted batteries. The corps d'armée are locally distributed through the monarchy, with the exception of the first corps, that of the guards. Previous to the war of 1866, Prussia had, besides the guards, eight corps d'armée, distributed through and called after the eight provinces of the kingdom, as follows:—1, Prussia; 2, Pomerania; 3, Brandenburg; 4, Saxony; 5, Posen; 6, Silesia; 7, Westphalia; 8, Rhenish Provinces. By the annexation of new territories two more corps d'armée were formed, namely, 9, Hanover, and 10, Hesse.

The strength of an ordinary battalion on active service consists of one field officer, four captains, four first lieutenants, nine second lieutenants, one surgeon, one assistant-surgeon, one paymaster, one quartermaster, 1,002 non-commissioned officers and privates.

When a war is imminent, the Government decrees the mobilisation of the whole army, or of such a portion as may be deemed necessary. In preparing for the campaign in 1866, the whole field army and the first levy of Landwehr were mobilised in about two weeks. Every commanding general mobilises his own corps d'armée, and the commandants of those fortresses which are ordered to be placed in a state of defence take their own measures for strengthening the fortifications, and for obtaining from the artillery depôts the guns necessary for the armament of their parapets. All orders are sent by telegraph wherever there exists telegraphic communication. The

process of the mobilisation may be classed under the following five heads:—1, The filling in of the field troops to their war strength; 2, the formation of dépôt troops; 3, the formation of garrison troops and the arming of the fortresses; 4, the mobilisation of the field administration; 5, the formation of the head-quarter staffs, who are to remain in the different districts to supply the places of those who march to the seat of war. The completion of the rank and file of the field troops to war strength is effected by drawing in some of the reserve soldiers, who supply half the total war strength of the infantry, one-third of that of the artillery, and one-twenty-fifth of that of the cavalry:—

The organisation of the army was as follows in 1866:—

Field troops.

	No. of men on peace-footing.	No. of men on war-footing.
Guard-infantry, 9 regiments ..	16,991 ..	27,054
Line-cavalry, 72 regiments	116,208 ..	216,432
Chasseurs and rifles, 10 battalions	5,340 ..	10,020
Total of infantry	138,539	253,506
Guard-cavalry, 8 regiments ..	4,813 ..	4,813
Line-cavalry, 40 regiments ..	24,000 ..	24,000
Landwehr-cavalry, 12 reg.	216 ..	7,200
Total of cavalry	29,049	36,013
Artillery, 9 brigades	18,194 ..	42,502
Guns	432 ..	864
Pioneers, 9 battalions	5,400 ..	9,018
Train, 9 battalions	2,097 ..	29,034
Total of field-troops	193,259	370,073

Garrison Troops.

Infantry, 36 regiments	1,972 ..	116,232
Cavalry	— ..	800
Artillery	4,995 ..	16,200
Pioneers	350 ..	1,950
Total	7,317	135,182

Total strength of the army 208,576 609,669

Reserve Troops.

	Men.
81 reserve battalions	8,162
10 companies Jäger reserves	1,692
60 reserve squadrons	12,000
9 companies pioneer service	2,225

Total reserves 104,414

Though Prussia has a large Roman Catholic population, the Protestant element preponderates in the army. The religious statistics of the year 1862 show that there are 11,298,276 Protestants, of whom 184,767 are in the army; 6,907,000 Roman Catholics, of whom 82,345 are in the army; 1,202 members of the Greek Church, of whom 6 are soldiers; 13,716 Anabaptists, of whom 8 are soldiers; 16,233 Dissenters, of whom 63 are soldiers; and 254,785 Jews, of whom 1,328 are in the army. This great preponderance of Protestants among the military is partly owing to the fact that out of nearly 8,000 officers in the active army, there are only a few hundred Catholics. In the military schools, out of 1,300 pupils, there are only from sixty to seventy Catholics.

There are 29 fortresses in the kingdom, of which five are of the first rank. They are garrisoned by 7,317 men in time of peace, and 135,182 during war, or preparation for war—"Kriegsbereitschaft." According to the statement of the Minister of War, laid before the second Chamber in the session of 1867, it is intended to strengthen and enlarge the whole of these fortifications.

[I am informed by Prussian officers that the principles here set forth are correct, but that modifications have been made in the details.—H. C.]

THE AUSTRIAN ARMY.

According to official returns, Austria possessed, on the peace-footing, at the commencement of 1867, an army of 269,103 men, rank and file, with 42,201 horses. Official papers, furnished by the War Office, describe the troops of the empire as constituted in the following manner:—

	Peace-footing.	War-footing.
80 regiments of infantry of the line, each of 3 battalions, with 6 companies.....	124,590	330,430
1 regiment Kaiserjäger, of 8 battalions, with 4 companies....	3,974	7,939
32 battalions of Feldjäger, of 6 companies each.....	23,200	41,761
14 regiments of frontier infantry	8,640	59,016
10 companies of "sanitary troops"	1,914	2,858
Total of infantry..	162,318	442,003
12 regiments of cuirassiers, of 6 squadrons.....each	11,376	14,172
2 regiments of dragoons, of 6 squadrons.....each	3,120	5,680
24 regiments of hussars and uklars, of 6 squadrons ..each	23,400	27,210
3 regiments of volunteer hussars and uklars, 8 squadrons..each	2,448	5,697
Total of cavalry ..	40,344	57,759
12 regiments of field artillery, of 10 batteries, with 4 companies.....	32,875	54,881
1 regiment of coast artillery, of 3 batteries, with 4 companies.....		
1 regiment of raketours, of 12 batteries, with 3 companies		
2 regiments of engineers, of 4 battalions.....		
6 battalions of pioneers.....	5,998	8,968
	3,797	6,416

The rest of the army of 269,103 men, on the peace footing, according to the Government tables, consists of the transport service, the *gendarmérie*, and various irregular troops in Transylvania and the border provinces.

By the terms of the "Compromise" come to between Austria and Hungary, the military forces of the whole empire are divided into the line, the Landwehr, or militia, and the Landsturm. The regiments of the line are under the control of the Minister of War of the Empire, and the Landwehr under the control of the Austrian and Hungarian Ministers of War. All the troops recruited in Hungary will be successively sent to Hungary, and all the troops stationed in the kingdom will be placed under the command of the Hungarian general-in-chief, who is to reside at Buda. The orders relating to great concentrating movements of troops will emanate from the King-Emperor.

The Austro-Hungarian army is formed by conscription, to which every man is liable who has reached his 20th year. In times of peace, the Government undertakes to furnish substitutes, at the average price of 1,200 florins, or £123 each. The term of service is eight years, after which the soldier is liable to serve two years longer in the army of reserve. During peace, a large proportion of the troops are sent home regularly on furlough. It is part of the military policy of the Government to encourage, by all possible means, the re-enlistment of old soldiers, for which purpose the fund contributed by those who seek substitutes is distributed in the shape of bounties. The pay of the troops, privates as well as officers, is smaller in the Austrian army than that of any other country in Europe, except Russia. A large proportion of the officers are noblemen. In 1861, there were 103 princes, 590 counts, 898 barons, 570 knights, and 2,826 untitled nobles in the army; the largest number proportionately in the cavalry, and the smallest in the artillery and the engineers. The upper ranks con-

sisted, in 1866, of 3 field-m Marshals, 14 Feldzeug-meister and generals of cavalry, 77 field-marshal-lieutenants, and 125 general-majors, in active service, besides 337 field-marshal-lieutenants and generals on half-pay.

Austria has 24 fortresses of the first and second rank, namely, Comorn, Carlsburg, Temesvar, Peterwardein, Eszek, Brod, Carlstadt, Canove, Arrat, Munkacz, Cracow, Gradisca, Olmütz, Leopoldstadt, Prague, Brixen, Theresienstadt, Kufstein, Linz, Salsburg, Buda, Ragusa, Zara, and Pola. The last-named is the chief naval fortress of the empire.

THE SWISS ARMY.

The thirteenth article of the Constitution of September 13th, 1848, forbids the maintenance of a standing army within the limits of the Confederation. To provide for the defence of the country, every citizen has to bear arms, in the management of which the children are instructed at school, from the age of eight, and they pass through regular exercises and public reviews. Such military instruction is voluntary on the part of the children, but is participated by the greater number of pupils at the upper and middle-class schools. They not only go through the infantry exercises, but practice gunnery, the necessary rifles and cannon—the latter 2 and 4 pounders—being furnished by the Federal Government.

The troops of the republic are divided into four classes, namely:—

1. The "Bundesauszug," or Federal army, consisting of all men able to bear arms, from the age of 20 to 34. All cantons are obliged, by the terms of the Constitution, to furnish at least 3 per cent. of their population to the "Bundesauszug."

2. The army of reserve, consisting of all men who have served in the first-class, from the age of 35 to 40. The numbers are calculated to amount to 1½ per cent. of the population.

3. The "Landwehr," or militia, comprising all men from the 41st to the 45th year.

4. The "Landsturm," or army of defence, including all men above 45, till the term when they are disabled by age from military service.

The numbers of the various classes, in actual readiness to take the field, are given as follows in an official return of July, 1862:—

1. Bundesauszug	82,747 men
2. Army of reserve	42,292 "
3. Landwehr	64,887 "
4. Landsturm	150,000 "

Total..... 339,926 men

The two first classes are organised in 80 battalions of infantry, numbering 80,000 men, and 120 companies of "sharpshooters," comprising 8,712 picked riflemen. The cavalry comprises 2,911 men, divided into 35 companies, and the artillery, 12,400 men, with four "mountain batteries," of 10 guns each, and eight "rocket batteries," besides twelve companies of sappers and miners.

The whole of the military expenses for the year 1863 were as follows:—

	Francs.	Cents.
Salaries of employés in the magazines and offices	52,707	90
Central military school	179,313	90
Annual manoeuvres.....	211,646	71
Staff of instructors of all arms.....	128,580	30
Instruction of recruits	1,295,890	49
Trigonometrical studies	38,000	0
Acquisition of guns, muskets, and munitions of war	1,595,370	99
Fortifications of Aarberg, Luzienssteig, St. Maurice, Bellinzona, Eglisau, and Basle	153,001	3
Military armament and various other items	115,678	6
Total	3,770,189	38
	or	£134,807

During the short civil war—the “Sonderbundkrieg”—of 1847, an army of 138,441 men, with 246 guns, was placed in the field, after less than three weeks' preparation. The troops were—

	Men.	Guns.
From the 14 federal cantons.....	98,861 ..	172
„ 8 seceded	39,580 ..	74
Total.....	138,441	246

The enlistment of citizens of the republic into foreign military service is forbidden by the terms of the Constitution of 1848, under the penalty of loss of all civil rights.

DISCUSSION.

MR. HYDE CLARKE said that as an old military student he felt great interest in the subject which had been brought before them, especially as he had formerly taken part in the discussion of questions of military administration. He thought the subject was one which might be advantageously discussed by civilians as well as by military men, and he regretted that any attempt should have been made to put a limit on the subjects for discussion, particularly as several statements had been made to the prejudice of the existing system which a little discussion might tend to modify. For instance, the proportion of officers to men being larger in the English army than abroad, was explained by the fact that there were a greater number of companies in a battalion. There was a great advantage in introducing this subject for public discussion, because the public would have an opportunity of learning what were the real difficulties of the question, and he hoped they would not be altogether led away by Mr. Cole's eloquence. There were many proposals which, when stated in a general way, looked very attractive, but which, when they came to be discussed, would be found to be utterly impracticable. He said this with the strongest possible adhesion to those principles of military reform which had been brought forward on the authority of many military men. He also thought it would be a great advantage to military men to have these matters discussed in public, in order to assist them in their endeavours to effect improvements in the service. In support of the principles brought forward by Mr. Cole, he might say that the army depended to a great extent upon the civil element. It would be found always that the real military qualities were not those which were vulgarly regarded as such, but were the same which led men to advance in civil life. It would be seen in the correspondence of the Duke of Wellington that the qualities even of the banker and financier were prominently required, and that the great military qualities were purely mental. Having said this much, he must make a considerable reservation with regard to two principles on which Mr. Cole had founded great part of his reforms. He had said, as many military men had said before, that future wars would be short and sharp, but it would be found in the history of the past that this expectation had always been held out as the result of improvements which were being made. Notwithstanding the Austrian and Prussian war, he did not believe that the period of long wars was over, and therefore it was, he believed, necessary that preparation for long wars should be made. Again, with regard to the peculiar circumstances of the present day, and the certainty of having notice of war beforehand, he did not think that this could be depended upon. They never knew what might be done by a single military ruler, or by a military cabal. Under all these circumstances he did not think they ought to lose sight of the dangers to which they might at any moment be exposed.

SIR CHARLES TREVELYAN, K.C.B., said the great difficulty of this subject consisted in its extent. Several portions of it, taken separately, would require a long discussion before the real merits were arrived at; as, for instance, military education, the rules of promotion, the

conditions of retirement, and the purchase system. He considered, therefore, that Mr. Cole had acted wisely in passing by all these hackneyed details, and going straight to the mainspring of the whole subject—aiming rather at cutting the knot than at untying it. The operation which he proposed might be compared to the pulling down of an old country manor house, and the utilisation of all the sound materials in the erection of a nobler and more commodious edifice; or to the growth of underwood under the shade of older trees, which themselves gradually yielded to time and to the woodman's axe. They had, in fact, to choose between two alternatives, the existing system of a standing army, and a new system of a popular army founded on instruction and morality. As briefly as possible he desired to refer to the main points of difference between the two, taking first the existing system. First, with regard to its sufficiency. Continental nations had adopted the system of popular armies, the French having lately reduced the term of service from seven to five years, which, in time of peace, practically amounted to less than four, and one result was a vast number of available men in case of need. The Emperor of the French could count at least 1,200,000 men excellently armed, and was able to put at any time 800,000 men into the field, and it was a balance to this immense force which we ought to provide. After an expenditure, however, of fifteen millions and a-half, the number of men whom we could put into the field was only stated at 40,000, which he believed was an outside estimate. We also boasted of our veteran soldiers, and a great expenditure had recently been incurred for the purpose of inducing men who had served for twelve years to continue nine years longer; but there was a considerable diversity of opinion as to which were best, old soldiers or new. The military art was studied quite as much on the Continent as in England, and of late years they had been going in the direction of having young soldiers. Prussia set the example of having her soldiers serve for three years. France had lately reduced the term from seven to five years, and Austria had followed the example of Prussia. He did not give his own opinion on this matter, but that of higher authorities. The Duke of Wellington's Peninsular army was composed of men who had seen some five years' service, and a man who had served two campaigns was considered an old soldier. The Duke of Cambridge stated before the Recruiting Commission that the best soldier was a man after three years' service. Colonel Fitz-Wygram said he should like to see every man leave after twelve years, and that they could get no good work out of their men after fourteen years, as the men got nervous about riding after that time. Again, with regard to economy, the effect of a standing army was to withdraw from the ranks of productive industry a large number of men in the very prime of their capacity, and add them to the ranks of unproductive expenditure. An army was not what it used to be. The general rise of wages, the higher standard of living and of comfort, and the spread of philanthropy, had all tended to make the army more expensive. Formerly anything was considered good enough for soldiers and sailors, but now they had to be treated like human beings and Christians. Then, again, scientific men were answerable for a large amount of expenditure in connection with the army; for science advanced so rapidly that immense sums had to be constantly spent in experiments. As an illustration of the great change which had taken place of late in this respect, he might mention that the late Lord Hardinge, the Commander-in-Chief, many years ago introduced him to Mr. Whitworth, who, he said, had made some important improvements in guns, and he was anxious to get the sanction of the Treasury to an expenditure of £3,000 or, at the utmost, £4,000, for experiments thereupon. Why, in the present day, such a sum would hardly suffice for a fortnight's experiments at Shoeburyness. He came to the conclusion, therefore, upon the whole, that it would be

totally impossible to support a standing army adequate to the requirements of England, for when France had 800,000 men at command, notwithstanding her undoubted peaceful intentions, we could not be considered prepared for all the eventualities without a much larger army than we had at present. Prussia spent about seven millions, and was able to put 300,000 men into the field against Austria. France spent from ten to twelve millions, and could command 800,000, while England, with an expenditure of 15½ millions, could only muster about 40,000. At this rate, if a large army were required, the expenditure would amount up to thirty or forty millions at once. He considered, therefore, that the argument on that head against a standing army was conclusive. As to the question of morality, it was of great importance when they took away a large number of the youth of the country that some consideration should be given to the question whether these young men were being trained for good or for evil. Lord Herbert's opinion as to the method of recruiting had already been quoted by Mr. Cole; Lord Dalhousie, Lord Eversley and Lord William Paulet said that under the present system, young men were inveigled into the army rather than induced to enter by fair representations of the advantages of the service, and H.R.H. the Duke of Cambridge freely admitted the evils of the existing system, although he did not see any way to avoid them. A common argument in support of the present system was that it exercised a good influence in training an inferior and rough class of the youth of the community, and to a certain extent this was true, but he was for extending the benefit to all classes. No doubt there was a large class of what were called in English confirmed reprobates, or, in French, *mauvais sujets*, and many of these found their way to the army, where they passed their time between the military prisons, the regimental cells, and the drill-yards, and where they were not worth their salt. They were only retained because the army would be in great part dissolved if they were dismissed; but they were retained, to the corruption, disgrace, and discredit of the army. Upon this point he might quote the testimony of Colonel Henderson, R.E., formerly Inspector-General of Military Prisons, as given in his report for 1865. It appeared that the number of prisoners had increased from 5,470 to 6,340, the main increase being amongst soldiers who had served from seven to fourteen years; amongst this class the number of commitments had gone on from 355 in 1859 to 2,166 in 1865. This was a remarkable fact, and showed, in his opinion, that while the community at large had been improving, the dregs of society had gone into the army, and made it worse than it was before. The death rate was a test of morality as well as of other things, and it appeared that although amongst men under 25 the mortality was less than among the civil population—this arising from the fact that the young men all underwent a rigorous medical examination before they were admitted—at more advanced ages the mortality was much heavier than amongst civilians. In concluding this part of the subject the evils of celibacy were remarked upon, and the figures quoted from the return of the Registrar-General for Scotland, showing that after a certain age married men had a prospect of 19½ years longer life than bachelors. The army was a society of enforced bachelors, the evil being thus intensified, and it must ever remain so to a very great extent, because military service was practically incompatible with married life, and the wife and children of a soldier were exposed to numerous and most grave evils. Turning to the question of a popular army, he considered that all these conditions were reversed; it was founded on morality and instruction. It might be said to have been invented in the following way:—Frederick the Great's standing army was for years the model for all Europe, but it was completely broken up by Napoleon at the battle of Jena, when the condition was imposed

upon Prussia of limiting her standing army to 40,000 men. This limit was agreed to, but instead of allowing the men to grow old in the service they were passed in constant succession through the army, so that when the reaction against Napoleon took place in 1813, Prussia was able to contribute something like 100,000, instead of 40,000, and the good results of the system had been abundantly shown in the last Prussian and Austrian war.

Major-General Sir WILLIAM DENISON said he should, if possible, attend the adjourned discussion on Friday morning, but in the name of the army he desired now to protest against many statements which had been made, tending to throw the odium which rightly attached to a few upon the whole mass. He denied *in toto* that the men in the army were of that demoralised character which Sir Charles Trevelyan had stated. There were black sheep amongst them undoubtedly, but so there were in all classes. They never could get angels of light to serve in the army, nor were they very plentiful in our factories or our workshops. They could not expect the morality of the army to be above the average in the lower working classes, and that standard was certainly not high. He left England in 1846 and returned in 1866, after 20 years' absence in India and the Colonies, and having been since, as chairman of the Rivers Commission, in the manufacturing districts, particularly in Lancashire, he was sorry to find that there had been during the interval a marked change for the worse in the relations between the employer and employed. He at first doubted his own impressions, but they were confirmed both by masters and workmen, and the fact was admitted by Mr. Gladstone and also by Mr. Henley. Of course, when he began to inquire into the cause of this, every man gave a different answer, according to his particular views. To return, however, to the subject under discussion, he complained that it had been treated in the loosest manner possible, and that, while Mr. Cole had deprecated discussion upon what he chose to term the details of army management, the whole of the discussion must necessarily turn on those details. Everyone admitted that there were evils in the present organisation of the different parts of the army, but the only suggestion in the shape of a general principle of reform was that one in every thirteen persons should be trained to arms; this would include every male between 16 and 26, and, although it might be true that people in the manufacturing districts had assented to the general proposition as put by Mr. Cole, he thought they would have very serious objections to it when the real effect of it was brought to their attention. He spoke as a military man, having some knowledge of organisation, and being one of the corps of engineers so highly complimented by the reader of the paper; and he doubted the capability of civilians, who knew nothing of the details, which really formed the whole science of the army system, to discuss the matter at all. He remembered when he was Governor-General of New South Wales that a question arose as to the defence of the harbour of Sydney, and a person introduced himself to him for the purpose of laying before him certain plans of his own on the subject. When asked, he said he was a tailor, and after listening to his plans, he (Sir Wm. Denison) asked him if he would not consider him a great ass if he were to go and attempt to teach him to make a coat. He did not like the idea of calling the Governor-General an ass, but at length, putting titles aside, he agreed that such would be his opinion, but he could not be got to admit what was pressed upon him, that he was equally an ass to attempt to teach a soldier his own business. When he was in India, he had to protest against the system by which the native army had been ruined. Lord Canning's proposition was that a portion of the army should be made irregular, the principle being to pick out an active, intelligent young officer, with a good knowledge of the language and habits of the natives, and tell him to raise a thousand men, giving him full power to act as

he thought fit, only prescribing that the number should be brought up to muster by a specified time. It was then supposed by the wiseacres at home that if it was much cheaper to have half the army irregular, the saving would be doubled by putting the whole in the same position, and the consequence was the whole army was made irregular, the principle of selection was destroyed, and there were six European officers to a regiment instead of 26; and whereas, at the time of the last mutiny, there was not a single native who had been trained to command, there now were plenty. He put this forward by way of illustration, to show the folly of people pronouncing upon matters of which they admitted that they knew nothing. These matters of detail which Mr. Cole professed to pass over, in reality involved the whole system. As to the drilling of boys at school, he recollected, fifty years ago, when he was at school, an old pensioner coming every Saturday to drill them, but, so far as he remembered, instead of awakening any great military ardour, they considered it rather a bore. The whole thing was a fallacy. He did not maintain that the army was as efficient as it ought to be or might be, but he deprecated such an entire change as was involved in this proposal. If a coat pinched a man under the arms, one way certainly was to go and order a new one, but the general practice was to go to a tailor and ask him to ease it in the particular spot where it was too tight. The best way was to remedy each specific evil as it was discovered, and by that means they would in time arrive at a more perfect organization. After having knocked about the world for some twenty years he had come to one conclusion more positively almost than any other, which was that nothing was so indelible as race. In Canada the Frenchman and Englishman were set down side by side, but they preserved their national peculiarities. It was the same thing at home with Irish, Scotch, Welsh, Jews, and Gipsies, and it was the same in India. Yet, notwithstanding this fact, it was a very common error that what suited one country must suit another; this was particularly an English fallacy, but it was a very mischievous one. We fancied that what was good for us must be good for other people, and we tried to cram down their throats, whether they liked it or not, our own system of religion, politics, and everything else. A short time ago, for instance, it was stated that they were going to try responsible government in India. In his opinion there could hardly be more flagrant folly. England was a peculiar nation, which had undergone a peculiar training, and after working at it for some 800 years, had brought her system of government to its present state; but the same system would not suit Frenchmen, and if it were forced upon them they would repudiate it. It had been tried with Spaniards in South America, and had set them to cutting one another's throats for the last 30 years, and the same process seemed likely to continue. The same experiment was going on in Italy at present, and he did not think it would be successful. The conclusion, therefore, which he came to was that a system which suited Austrians, Prussians, and the French, was, *a priori*, most likely *not* to suit the English, whose habits of thought and action were so totally different. He believed, therefore, that it would be better to let military organization alone, or only subject it to such judicious reforms as might fairly be discussed amongst men acquainted with the subject, and not by men who knew nothing whatever about it. If permitted to re-open the discussion on Friday morning, he would make some further observations.

The discussion was then adjourned to Friday morning (this day), at 11 a.m.

COMMERCIAL SCHOOL OF THE CHAMBER OF COMMERCE OF PARIS.

This useful school, which was noticed in the *Journal* in the month of November, 1867, seems to progress in

a highly satisfactory manner, and we have now before us the report of the session ending in the autumn of last year. The establishment is but five years old, and the entire course of study occupies four years, so that the first round of study was finished last year.

The charge for each pupil in this school is sixteen shillings per month, and the cost to the Chamber of Commerce is about \$1,200 per annum, which the President has declared publicly the Chamber is quite prepared to meet, for the school has met with the complete sympathy of the body of merchants and manufacturers, who eagerly give employment to the youths leaving the schools with full diplomas or certificates of capacity. At the end of the last session eight outgoing pupils, who had remained the full time in the school, received diplomas, and nine were awarded certificates at the end of the three years' study. The long list of prizes shows that in future years the number of young men thus prepared for commercial pursuits will be greatly increased; the progress of the school is, in fact, clearly indicated by the increased number of prizes awarded annually.

In addition to the ordinary class prizes, there are prizes of honour in each class; these are given by the Minister of Public Instruction, the Chamber of Commerce of Paris, the Cercle de la Librairie of Paris, and by a society formed of the earliest pupils of the school. The programme of the studies of this school may be useful, either as a guide or by way of comparison for those interested in commercial education. The course for the preparatory class, which is not a necessary portion of the curriculum, and only for boys under twelve years of age, consists of moral and religious instruction, writing, orthography, arithmetic, the English and German languages, the elements of history and geography, and drawing—that of the first scholastic year of the same, together with French grammar, book-keeping, the Spanish language, and commercial geography. During the second year are added commercial arithmetic and the elements of technology; and in the third, international commercial law, literature, and political economy. During the fourth year are added to the preceding courses on moral philosophy and rhetoric. In October last evening classes were opened at the school for elementary studies, the three languages already named, book-keeping, and commercial law. These classes are quite distinct from the school.

RECENT EXPERIMENTS WITH SCHULTZE'S NEW GRANULATED WOOD GUNPOWDER.

COMMUNICATED BY MAJOR-GENERAL SIR VINCENT EYRE, C.B., K.C.S.I., MEMBER OF THE COUNCIL.

1. These experiments took place on Wednesday, the 27th January, about a mile from Wandsworth, on the banks of the river Wandle, for the satisfaction of the local authorities, and under the direction of Professor Miller, of King's College, in consequence of an application made by Mr. James D. Dougal, gunmaker, of St. James's-street, for a license, enabling him to establish a manufactory for the above-named powder in that locality. As they were of a novel and interesting nature, the following brief account of them may prove acceptable to the readers of the *Journal of the Society of Arts*.

2. The main object of the authorities was, of course, to obtain satisfactory proof that the safety of the neighbourhood would not be imperilled by the establishment of the works in question; the spot selected being bounded on one side by a carriage-road, and on the other by a railway, though tolerably clear from habitations, and with abundance of water close at hand in the river Wandle.

3. At 2½ p.m., Captain Schultze himself appeared, accompanied by Mr. Dougal and other scientific gentlemen interested in the invention; and among the spectators were Generals Sir George Pollock and Sir George Lawrence; Mr. Hudson; Colonels Smith and Gompertz,

Royal Engineers; and several ladies. The experiments were then commenced, under Professor Miller's orders, as follows:—

4. Firstly, an open deal box, of about 14 inches in cubic dimensions, was placed on the ground, and received the contents of 25 canisters of 2lbs. each of the powder in a loose condition. The latter, being fired by a slow match, exploded upwards in a white cloud without noise, and without any damage to the box, which, indeed, was scarcely moved out of its position. It was explained that 50lbs. of Schultze's powder is equal in force and in bulk to 100lbs. of ordinary gunpowder.

5. Secondly, five of the aforesaid 2lb-canisters, filled and fastened, were placed upright in the same box, and on the central one being ignited only two out of the five exploded; the box still escaping almost uninjured. The noise was also trifling.

6. Thirdly, the first experiment was repeated, only with ordinary powder, for the sake of comparison, and a loud explosion followed, whereby the box was violently rent asunder, and its pieces sent flying several yards distant.

7. Fourthly.—One of the empty tin canisters, having both ends open, being stuck upright on the ground, was partially filled with one pound of Schultze's powder, and was neither upset nor injured by the explosion of the latter; while, on the contrary, two ounces of common powder, similarly placed, sent the canister flying to a distance of three feet.

8. Thus far nothing could be more satisfactory than the results in favour of the comparative harmlessness of Schultze's powder, notwithstanding that its propelling force is double that of the ordinary powder. This was pretty clearly evidenced by some subsequent experiments with one of Dougal's breech-loading fowling pieces.

9. In March, 1868, Mr. Dougal delivered a lecture at the Royal United Service Institution, wherein he clearly explained the peculiar characteristics of this new explosive, and its adaptability to military purposes. The following summary may interest those to whom the subject is new. The component parts are saltpetre and uncharred alder wood, without sulphur. The wood being reduced to a granular state, consisting of minute cubes and oblongs, by means of fine saws and other implements, is subjected to certain chemical processes for the removal of acids and other soluble substances. It is then impregnated with concentrated nitric acid in combination with sulphuric acid, the latter being used solely for the purpose of driving the nitric acid into the wood, which being effected, the sulphuric acid is entirely withdrawn to be again utilised. The wood having been thus impregnated, undergoes some cleansing processes, and is either dried for immediate conversion into finished powder, or stored in a damp state for safety until required. The final and most important process consists in its incorporation with the saltpetre; and, unfortunately, Mr. Dougal's paper furnishes no particulars as to the method employed. But it is understood that there is no grinding, therefore that source of danger is absent. Indeed the original forms of the wood in grain seem to be preserved in the complete powder, which is finally dried for a space of twelve to eighteen hours, and is then ready for use.

10. Mr. Dougal claims the following advantages for this new invention:—

1st. Safety and rapidity of manufacture, and consequent reduction of cost.

2nd. Safety in transport and storage.

3rd. Less injury by absorption of damp, inasmuch as the imbibed humidity, up to three per cent., is not injurious to its propelling powers; and even if ten per cent. be added no mischief accrues if the powder be re-dried.

4th. Diminution of recoil.

5th. Ample driving force.

6th. The power of regulating its rending force so as to adapt it to various requirements.

7th. Absence of fouling.

11. This powder seems undoubtedly destined sooner or later to supplant all rivals in public favour for use in small arms, provided that, on adequate trial, it be found possessed of the numerous advantages involved in such virtues as "absence of fouling;" "absence or diminution of smoke;" "diminution of recoil;" "reduction of heat in prolonged shooting;" "greater initial velocity and regularity of shooting;" in addition to the other tests already undergone with so much success.

It is a sufficiently significant fact that a military committee of officers, appointed by the French Minister of War to investigate its properties at Vincennes, have unanimously recommended its adoption in the French army for use with the Chassepot rifles.

12. In some respects it seems peculiarly worthy of a fair trial in India, where powder is subject to constant deterioration from exposure to damp in the rainy season. The assertion, too, that the Schultze powder is capable of being stored and shipped in a moist, and therefore unexplosive state, is too important to be overlooked. The total absence of sulphur is another item in its favour, as regards India, where that ingredient can only be obtained in a pure state from Sicily, at a heavy cost. The very impure specimens supplied from the Persian Gulf, Burmah, Sumatra, and elsewhere, require to be fuzed before use.

The subject is one well worthy of deliberate investigation in regard to economy, safety, and efficiency.

REPORT ON THE MALT LIQUORS SOLD IN THE UNITED KINGDOM, WITH ANALYSES AND COMMENTS.

(From the *British Medical Journal*.)

Although the recent introduction of the cheaper kinds of wine into this country has led to their being used much more largely than was the case before the alteration of import duty, it appears to have had little influence on the habits of the chief beer-consuming class, and our national beverage is still, for a large portion of the community, as important an article of diet as ever; while its manufacture, employing a large amount of capital and labour, and constituting a gigantic industry, is a great source of trade, of individual profit, and of revenue to the State.

The following statistics* will furnish an idea of the extent of the business of beer brewing in this country:—

	MALT.		SUGAR.		Total quantity of malt equivalent to the malt and sugar used in brewing.
	Charged with duty.	Used in brewing.	Used in brewing.	Equivalent in malt, 200 lbs. sugar to 8 bus. malt.	
	bushels.	bushels.	lbs.	bushels.	bushels.
1865...	48,538,412	45,093,778	3,698,180	140,883	45,234,661
1866...	50,163,487	50,777,200	7,628,206	290,598	51,067,798
1867...	50,915,828	49,392,856	26,532,403	1,010,758	50,403,614

At the rate of 2½ bushels per barrel, these quantities would represent about 20 million barrels of beer brewed annually in the kingdom.

The general excellence of British beer, in its various modifications, has long been recognised; and, although beer is largely consumed in other countries, it has been customary to consider both the method and system of manufacture adopted in this country, as well as the product itself, as being in most respects far superior to any other. But, as in other branches of industry, the pre-eminence we have held in regard to foreign countries has, during late years, been lessened or done away with by their more rapid progress in manufacturing arts, so in the production of malt liquor, we are now threatened with a foreign competition which would probably have been regarded as ridiculous a few years ago.

* For these data we are indebted to the knowledge of Mr. G. Phillips, Chemist to the Inland Revenue Department.

Of other countries than this, where beer is consumed and produced, Germany has long been famous, both for the capacity of its beer-drinkers, and for certain peculiarities of the beer made there; especially that kind known as Bavarian beer, which is brewed in a manner somewhat different from that generally practised in this country. During the last thirty years, great attention has been paid in Germany to the brewing of malt liquors by some of the most eminent chemists and scientific men, among whom the name of Liebig stands prominent. The various governments have also given great assistance in promoting and improving the manufacture; so that while very great progress has been made in the *rationale* and practice of the art of brewing, the manufacture has considerably increased, and beer is now largely brewed, upon the Bavarian system, in many other parts of Germany, even in the wine districts, especially in the neighbourhood of the Rhine, and in Austria,* where its production has extended, since 1848, through all the provinces along the Danube, even to the Black Sea. So great, indeed, is the repute of the German brewers, that it is now customary with some of our largest brewers to employ in their establishments German chemists; from which fact it may be inferred that persons with the requisite technical skill and scientific acquirements cannot be obtained in this country. At the Paris Exhibition, 1867, the Viennese and Bavarian beer attracted great attention; and as it is from this direction that the competition, already referred to, in the production of beer is now commencing to be exercised, it is conceived that it would be of interest to examine what are the qualities of this beer as compared with the various kinds of malt liquor made here.

In making the comparison, the question of actual or possible adulteration will be, for the present at least, left out of consideration, and it will be, meanwhile, assumed that the various kinds of beer are simply the fermented product of malt and hops. Thus considered, beer should chiefly consist of water, alcohol, and extract—consisting of sugar, dextrin, and nitrogenous substance—together with carbonic acid, small amounts of acetic and lactic acids, and the saline substances partly originating from the water used in brewing, and partly extracted from the malt and hops.

From this point of view the quality of beer, independently of its characteristics of flavour and aspect, will vary according to the proportions of malt and water used in the brewing. This is indicated by the relative amounts of alcohol, acetic acid, and extract contained in the beer, since the amounts of these constituents together bear a definite relation to the specific gravity of the unfermented wort, which is greater or less, according to the proportion of malt to water.

The degrees of attenuation, or loss of gravity of beer-worts, corresponding to various amounts of alcohol produced by fermentation, have been very carefully determined; so that by estimating the amount of alcohol in beer, and adding the corresponding degrees of gravity lost by the wort to the specific gravity of the beer after being deprived of its alcohol, the specific gravity of the unfermented wort—or the original gravity of the beer, as it is termed—is ascertainable. The amount of malt used in producing the wort is then indicated by the rule, that it is at the rate of one bushel per barrel of beer for every 27 degrees by which the specific gravity of the wort—or original gravity of the beer—exceeds that of water.

VIENNA BEER.

The chief peculiarity of this beer, like that of Bavaria and other parts of Germany, is due to the fermentation of the wort being conducted very slowly at a low temperature, and so that the yeast produced meanwhile falls to

the bottom of the liquor instead of rising as froth to the surface. The beer brewed by this sedimentary fermentation keeps better than that made by the frothing fermentation at a higher temperature, and it bears contact with atmospheric air without turning sour, which is not the case with much of the beer brewed in this country for ordinary consumption. The difference between these two kinds of fermentation is explained by Liebig as consisting in the greater facility which sedimentary fermentation affords for the oxidation and perfect separation of the soluble gluten of the wort by atmospheric air. In the frothing fermentation this is, to a great extent, prevented by the thick layer of yeast formed on the surface of the liquor, and then the gluten, in its conversion into yeast, appears to abstract oxygen from the sugar, so that the proportion of this substance to gluten is reduced, and after the fermentation is completed, some unaltered gluten remains which, by a subsequent process, determines the conversion of alcohol into acetic acid. In sedimentary fermentation, on the contrary, there is little or no scum formed on the surface of the liquor, and air has free access to it, so that less or none of the gluten is left unconverted into yeast.

The storing or maturing of this kind of beer is another point to which great attention is paid; and, instead of being stored in enormous vats, as in this country, casks are used, which are placed in cellars, where a low and uniform temperature is maintained. The basaltic and other porous volcanic rocks, abounding in the Rhine district, afford great facilities for the construction of such cellars, and the rapid growth of the beer-brewing trade there is mainly owing to this circumstance. In Bavaria and the Austrian dominions ice is largely employed for keeping the store-cellars at a low temperature.

Generally speaking, the beer drunk in Austria and Germany has less alcoholic strength than that consumed here. The strongest kinds, such as those known in Bavaria by the names "Holy Father," "Salvator," and "Buck," rarely contain so much as five per cent. by weight of absolute alcohol. The store-beer, or *lager beer*, generally contains about 3·5 per cent., ranging from 4 to 2·8 per cent.; and the ordinary beer for quick draught, *schenk beer*, corresponding in that respect to our porter, contains from 2·25 to 3·5 per cent. of alcohol. In the Austrian dominions, the beer is generally preferred rather weaker than in Bavaria; but in Austria the organisation of the breweries, and the system of conducting the business, have been developed in such a manner as to assimilate more to the vast establishments we have in this country.

Two kinds of Austrian beer are now being imported into England; one is stated to be brewed by Dreher, at Schwechat, near Vienna; the other, by the Brewery Company, at Liesing, also near Vienna. An examination of these, as obtained at the several places where they are retailed, has given the following results:—

	Dreher's beer bought at the Vienna Restaurant, 395, Strand.	Liesing beer, bought at the Crown Coffee House, 41, Holborn.
Specific gravity.....	1019·76	1019·11
Alcohol	4·43	4·45
Acetic acid	·12	·12
Extract	7·05	6·82
Original gravity	1062·27	1061·67

Both these samples of beer, when fresh drawn, were tolerably bright, and had a thick persistent foam on the surface. The taste, especially of Dreher's beer, is sweeter and more luscious than that of English beer, different, however, from that of Scotch ale; and there is a peculiar flavour of barley. The hop flavour is distinct in both, and the bitterness more perceptible, a minute or so, after drinking. As will be seen from the above results of analysis, there is no very great difference, between the two samples in regard to quality, so far as that can be determined on the principle already described

* The total quantity of beer brewed in Austria, during 1866, is stated to have been about four millions of barrels, of which quantity upwards of 200 000 barrels was brewed in three breweries situated near Vienna and Pesth.

the proportion of malt used in brewing, as indicated by the original gravity, being for—

Dreher's beer 2-30 bushels per barrel of 36 gallons.
Liesing beer 2-28 " " "

Altogether, however, these samples of beer do not appear to be equal in character to the best beer met with in Vienna or Pesth, although the price of sixpence per pint is about three times as much as is charged there.

Fine Arts.

EXHIBITION AT CHARTRES.—The regional exhibition of agriculture is appointed to take place in the month of May, and the Archaeological Society of the department of the Eure-et-Loir has decided that an artistic and industrial exhibition shall be held at the same time. In 1858 the same society organised an artistic exhibition, which was highly successful, but the plan of the coming exhibition is much more extended, and promises to be very important; it will include archaeology, objects of art and curiosity, and modern works of art of all countries. The programme includes the three following classes of objects:—1, ancient objects of all kinds belonging to the department, whether found there or being in the possession of persons residing within it, including sculpture, painting, tapestry, furniture, faïences, armour and arms, books, &c.; 2, antiquities belonging to persons not belonging to the department, but having an interest for the history and archaeology of the department; 3, works of fine art, painting, sculpture, drawing, architecture, and engraving, by living artists of all countries. The cost of carriage, packing, and unpacking of all articles belonging to the first and second classes will be defrayed by the society if the proprietors desire it. All precautions will be taken against accident; special workmen will be engaged for packing and unpacking; and, besides the officers and servants employed in the exhibition, the members of the committee will themselves watch day and night over the objects of art and antiquity confided to their care. Applications for space are invited to be sent in as early as possible, and, at the latest, before the first day of March. The exhibition is to open on the first of May, and continue open about a month. Contributions to be sent in during the first half of the month of April. Prices are to be furnished of all works of art intended for sale, and a lottery forms part of the plan. The award of prizes is to be made by a jury elected by the committee and the exhibitors themselves. Applications to be addressed to M. Merlet, secrétaire du Comité de l'Exposition, Chartres.

Commerce.

THE PORT OF SAVONA.—The trade of Savona is daily increasing, and the shipbuilding yards have plenty of work. A bark of 1,100 tons burden, the *Ottone* (the largest ever built at Savona), was launched on the 28th November, for a shipowner of that town. At the end of last month 65 emigrants sailed from that port for Monte Video, and three other emigrant vessels are now loading for South American ports. The railway from Genoa to Savona has been opened some months, and a good diligence service is now established between that town and Nice. The works of the railway to Nice are also being pushed forward in a satisfactory manner, and several of the most important tunnels are now completed. There is now every hope of the railway to Turin being continued, as a convention between the Minister of Public Works and the contractor has been signed. The entire line is to be finished in 1872, and the branch to Acqui in 1871.

CONSUMPTION OF TIMBER.—The constantly increasing price of wood in France and other countries is often a

matter of surprise, especially as the consumption of wood for building purposes, as well as in the form of fuel, decreases in proportion every year. Some notes respecting the special applications of wood help to explain the fact. In the first place the forests of the Old World are nearly exhausted, and in the second, a number of new applications have grown up, while others have been greatly augmented; for instance, the rapid increase in the use of coal and metals causes an increased consumption of timber in the mines; the manufacture of railway carriages requires more timber than all the navies in the world formerly consumed, while the railways take also a large quantity for sleepers; the greatly-increased cultivation of hops in France uses up an immense number of small trees, for poles, which bring the proprietor a high price; in the south of France the export of wine has become so large that the coopers cannot find oak enough in their own country, and are obtaining it from Trieste, Illyria, America, and other parts; it is computed that at least 80,000 steres of wood are used in France alone in the making of lucifer matches; toys also make a great hole in the supply of wood; it is said that two hundred thousand dozens of children's drums are made monthly in Paris alone, requiring thirty millions of bodies and sixty millions of drumsticks per annum. Nearly the whole of the wood used for these drums comes from Villiers-Cotterets, and it represents the produce of nearly fifty thousand acres of timber land. Whole villages in the Haute-Saône are employed in the manufacture of curry-comb handles, which require nearly all the beech grown in the neighbourhood. And amongst other causes of the dearness of wood, we have its application to paper-making, which, from the dearness of linen rags, and the constant improvement of the machinery and methods for working wood pulp, increases at an immense rate; in fact, when we look at the progress going on in production of all kinds, the wonder seems to be that any wood at all should be still found in Europe.

POSTAL INTERCOURSE BETWEEN ENGLAND AND FRANCE.—The following appeared in the *Times* City article:—"SIR,—Your correspondent 'Scotus,' in his letter on the subject of postage between England and France, scarcely puts the case fairly to the English Post-office. The proposition of the English office is that the halfounce, reckoned as equivalent to 15 grammes, which has long been in use as the weight of the double letter between France and England, shall be made the single rate, the same as is the case with all letters passing between England and every country in Europe, excepting France and countries necessarily served through France. Belgium and Switzerland, whose system of weights is precisely the same as that of France, adopt the weight of 15 grammes for the single letter, and the postage to and from England is only 3d. (30 centimes). To Holland the rate for the same weight is only 3d., or 15 cents. With France the present single rate is 4d. for 7½ grammes, and 8d. for 15 grammes. A letter weighing over 7½ and under 15 grammes, sent *via* Calais to Belgium, pays 4d.; the same letter sent to Calais itself would pay 8d. The advantages to the French authorities of raising the weight of the single letter to 15 grammes would be that they would get rid of the use of the present weights of 7½ grammes, 22½ grammes, &c., without requiring any additional weights beyond those at present in use; and, assuming the postage to remain at 4d. (40 centimes), French merchants would be placed more nearly on an equality with their Dutch, Belgian, and Swiss compeers, who now send letters to England for 30 centimes the 15 grammes. The advantage to the English Post-office would be that the single rate would then be the same to every country throughout Europe. The change from one-quarter to one-third of an ounce, as proposed by France, would render necessary that weights of one-third and two-thirds of an ounce should be provided for every village post-office in England, and be procured by every mercantile establishment having correspondence

with France, solely for the purpose of letters to and through that country; and after this change had been effected the anomaly would still remain that while the single rate recognised by every other European country is the halfpence, and the postal charge to Holland, Belgium, and Switzerland 3d. for this weight, the postal rate to France would be 4d. for only one third of an ounce.—We are, &c., RICHARD SYMONDS AND SON.

"3, Ingram-court, London, January 26th."

MINING IN PRUSSIA.—The statistics relating to mining in Prussia show the surprising progress made by that country during the last twenty years in this industry by the introduction of improved systems of extraction by the use of steam power. In 1837 there were 1,587 mines worked in Prussia, giving employment to 33,161 miners. In 1867 this number had increased to 2,162, with 48,351 miners. The total value of the mineral production, which in 1837 was £833,932, in 1867 amounted to upwards of £8,565,000.

COAL IN CALIFORNIA.—An important discovery of coal has been made at Argenta, in California, situated about 370 miles from Sacramento. This coal is said to be of excellent quality, and will no doubt be of great service to the American steamers that run from San Francisco to China and Japan.

Colonies.

EMIGRATION IN 1868.—The total number of emigrants who left the ports of the United Kingdom during 1868 was 192,344; of these 58,268 were English, 14,954 Scotch, 64,961 Irish, 51,956 foreigners, and 6,182 origin not distinguished. In 1867, the total number of emigrants was 195,953. In 1868, 155,532 sailed to the United States, 21,058 to North American colonies, 12,809 to Australian colonies, and 6,922 to all other places. The following is a list of the emigrants, in 1868, whose occupation was classified:—

General and agricultural labourers	50,515
Children under twelve years	38,416
Married women	23,598
Domestic servants	8,592
Farmers	7,258
Miners and quarrymen	8,500
Professional clerks and merchants	7,171
Carpenters	2,553
Tailors	951
Clerks	790
Smiths	712
Spinners and weavers	381
Seamen and coal miners	367

PRODUCTIVE CAPACITY OF NATAL.—The following (dated Feb. 4), which has appeared in the *Times*, is by Dr. R. J. Mann, whose papers on this subject, read before the Society in January and December, 1868, will be in the recollection of members:—"It will possibly interest such of your readers as care to mark colonial progress, to learn that in the first nine months of the last year, the latest period for which returns are yet available, the value of imports in the colony of Natal was, for the first time in its history, within £12,359 of the value of exports. The exact figures for the nine months were—value of imports, £212,382; value of exports, £200,023. The value of the exports for the corresponding nine months of 1867 was £168,701, thus giving an increase of £31,322 within twelve months. The value of coffee imported into the colony has been reduced within five years from £26,000 to £9,000 for the year. This, of course, is due to the increase of the colonial produce. Previously to the year 1852 the Natal exports were not worth notice. In 1852 their value was under £28,000. In 1862 the value was £127,000. In 1867 it was £225,691. In the first nine months of 1868 it was £200,000. The estimated production of wool in

Natal for the year 1868 was 434,673lbs. The values exported of the following articles were:—

	1862.	1867.
Arrowroot	Nothing	£9,000
Salt meat	Nothing	4,000
Living animals	Nothing	1,400
Wool	£2,000	80,000
Cotton wool	65	5,000
Sugar	12	70,000
Spices	Nothing	12,000
Coffee	Nothing	204

In a letter I have just received from an intelligent friend, holding a high official and very responsible position in the colony, I have the following very precise information regarding the indications of gold within the colony. The precious metal is found exclusively in a very remarkable old deposit of water—worn pebbles, principally of quartz and granite imbedded in coarse ferruginous sand. This deposit occurs in patches, which are scattered from the neighbourhood of the Mukomorize river, in latitude 30°10' S., to the mouth of the Muzumbe river, in gold found in this deposit is in particles, varying from latitude 30°30' S., a stretch of about 30 miles. The the minutest specks to grains the size of a pin's head. My friend adds that he has before him while he writes 150 specks of gold which he had himself helped to wash out of this auriferous deposit, and that operations are in progress to decide whether the numerous quartz reefs which cut everywhere through the granite of the colony contain gold or not. At present it is quite impossible to say whether the Natal gold will be found anywhere to be in sufficient quantity to be worth mining and collecting, but my friend's present impression is that the whole of the Natal coast below the line of the primitive rocks, which run in a northerly direction from the mouth of the River Muzunkulu, in south latitude 30°45' deg., quite up to Mosilikatze's country, between the Limpopo and Zambesi, will be found to be auriferous, and that those rocks will themselves prove to be what Sir Roderick Murchison has termed them, the true geological axis of the colony and district. There had been no fresh facts from the interior goldfields that lie at the inner end of this axis, but there seemed to be no reason to doubt either their extent or their richness. The delay in the acquisition of further reliable information up to that time is referred to the first and only parties who had yet visited the auriferous track not being men of technical experience, or with capacity to pursue their investigations with harmony among themselves. As the mail was leaving, traces of gold were reported on the north-eastern frontier of the colony, near the River Tugela."

Notes.

MARITIME EXHIBITION AT NAPLES.—Following the example set by France and Norway, at Boulogne, Havre, Arcachon, and Bergen, the first maritime exhibition will be held in the autumn of the present year at Naples. This exhibition, which will be international, presents an important field for British exhibitors of naval appliances, as Italy, from her geographical position, is not unlikely to become a great maritime power. This exhibition, as that of Havre, will embrace all apparatus and implements used in fishing, pisciculture, and fish curing, and will include ship stores and provisions, &c.

SCHOOL FOR SHEPHERDS IN FRANCE.—The French Government is determined to establish a school for the instruction of youths for shepherds; the locality selected is the Imperial Sheep Farm of the Haut Tingry, in the department of the Pas de Calais, where there is a magnificent flock of merinos and half-breeds, from which a considerable number of rams are supplied to farmers and breeders all over the country. The farm comprises about 500 acres of land.

THE MONT CENIS TUNNEL.—The position of these works up to the 31st January was as follows:—

	Metres.
Length driven at Bardonnèche	5,414
„ „ „ Modane	3,860·15
Total length of tunnel driven	9,274·15
Length remaining to be driven	2,945·85

Total length of tunnel 12,220·00

OMNIBUSES IN PARIS.—A Paris journal gives the following particulars respecting the omnibus service of the capital:—"Those of the line from the church of the Madeleine to the Place de la Bastille make the double journey 800 times a day; and the total number of omnibuses of various lines that pass the Place du Palais Royal daily amounts to 1,100. Each omnibus carries, on an average, thirty persons per journey, so that the vehicles above mentioned convey about 57,000 persons daily. There are at present 32 regular lines of omnibuses within the limits of the city, besides those attached to each of the railway termini, a large number running to the various places in the outskirts of Paris, and the omnibuses of the American railway to St. Cloud and Versailles, which carry a large number of passengers."

Correspondence.

VELOCIPEDES.—SIR,—This prevailing fashion in locomotion will of course soon fade out, as it did many years ago; for, unless certain conditions be complied with, incompatible with the present or the older form of the machine, it is not an economical use of muscular power, which would be much more beneficially employed in drawing instead of riding in a velocipede and propelling. The first condition would be to obtain a perfectly level road, smooth as a billiard table, when the labour of propelling would be merely nominal, provided, of course, that speed of transit could be obtained without corresponding rapid muscular action, an impossibility with the present construction of velocipedes. In order to overcome the first difficulty—the impossible smooth road—we must have recourse to the patent vulcanised india-rubber tire, a perfect appliance that has been locked up for more than a century by the absurd state of our patent laws, which have stuck patents upon every portion of the process like quills upon a porcupine, and rendered a most valuable invention an unapproachable dead letter. At the Great Exhibition of 1861, a heavy cartwheel so tired was made to roll over the hands and feet of the bystanders without causing the smallest sensation of pain, or the slightest jerk to the wheel. We can now, therefore, dispense with the smooth road, as well as with carriage springs; and, further, the fact of running over a living being will cause no injury to life or limb. India-rubber tires have been applied to heavy traction engines with perfect success, while the bite on the road far exceeds all expectation. The second condition, the difference of speed required between the machine and the muscular action of the legs, is, singular to state, readily got over by the same beautiful appliance, the india-rubber tire. Let a secondary wheel, 30 inches in diameter, provided with an india-rubber tire, be fixed on a short secondary spindle, with a crank nine inches long at each side placed at 180°; also let a pinion or nut, five inches diameter, india-rubber tired, be fixed on the centre of the main driving axle, the bite of the two being equal to that of any gearing; attach two long horizontal pedals to the cranks with shoes provided with small friction rollers, and the machine will be complete. By this construction the velocipedes will measure the roads or move at the rate of 20 miles an hour, while the muscular action of the feet will only be at about the rate of

walking two miles for the same space of time, and an active young man will be able to drive his machine at double that rate, or 40 miles an hour. The minor appliances for stopping and turning sharp corners, &c., may be easily contrived by any expert mechanic; but how to get over the difficulty of passing horses on the road with the machine at speed, I must confess passes my comprehension. No horse will encounter or pass a swift machine not drawn by biped or quadruped; it utterly confounds their own ideas of locomotion. The suggestion by your latest correspondent of supplying the letter carriers with velocipedes would not be very pleasant to pedestrians who might expect to be knocked over at every sharp turn, though, perhaps, by very elastic buffers. The recommendation of a light at night is a snare and a delusion, for it is impossible to discover in what direction the light is moving in the midst of darkness. This machine is erroneously called a "velocipede." The proper name would be "velocifere," because its intention is to increase the speed of transit and diminish that of muscular action.—I am, &c., HENRY W. REVELEY.

Reading, Feb. 15th, 1869.

WASTE IN GLASS MANUFACTURE.—SIR,—I regard the paper read by Mr. P. L. Simmonds, on waste substances, as of immense value, inasmuch as it is moving exactly in the direction in which science should move, i.e., as nature moves, for in the great laboratory of the universe everything is utilised, and this should be the case especially in our manufactories, where there is often great waste of material. I have observed this to be the case in the manufacture of plate glass, where what is technically called the "welt" takes up a large portion of the glass, and is destroyed, amounting to more than five per cent., and not unfrequently, from the inequality and difference in thickness, causes the whole glass to break when drawn from the kiln. A tool, costing only a few shillings, and requiring no additional labour, was used in France about 80 years ago, when casting plate glass was invented, which saves the "welt," but as the price of plate glass was then very high, and the sizes compared to the present very small, it ceased to be used, and is now unknown to the trade. Its adoption at the present time is very desirable, as English manufacturers have to compete with importers, and it would be far preferable to economise than to adopt the practice, too often resorted to, of manufacturing an inferior article. I have, therefore, thought it desirable to draw attention to the subject.—I am, &c., W. BRADFORD.

120, Cambridge-road, N.E., February 12th, 1869.

PHOTOGRAPHY AND THE MAGIC LANTERN.—SIR,—In a paper read before the Society, on the 20th January, on "Photography and the Magic Lantern," Mr. Highley states that "the honour of introducing a new method of instruction into our collegiate and higher branches of education, by means of the magic lantern and photographic slides, is due to Colonel Tchepelevsky, a Russian officer." May I be permitted to inform you that such a method of instruction has been in use in the schools of the Royal Military Asylum, and also in the army schools, for more than ten years. The honour of its introduction is due to Major-General Lefroy, R.A., and, on his recommendation, the Secretary of State for War entrusted to myself the arrangements necessary for the development of the system. More than eighty stations are now provided with lanterns and slides, and lectures are regularly delivered to the troops at these stations by officers, chaplains, and army schoolmasters, on English history, geography, the manners and customs of nations, fortifications, deeds of daring by sea and land, natural history, and other useful, entertaining, and instructive subjects. During the season 1865-6 more than 1,300 illustrated lectures were delivered to the troops. Nearly the whole of the lanterns, photographic and other slides used (and which have given the highest satisfaction) were prepared by Messrs. Newton, of Fleet-street. That you may be enabled to form a correct estimate of what

has been done in the army schools, I forward for your perusal detailed lists of the slides that have, from time to time, been provided for the use of the troops, under the sanction of the Council of Military Education; and, for full accounts of the success of the lectures, I beg to refer your readers to the reports of the Council of Military Education for 1864-65 and 1866. This illustrative method of teaching has been introduced into several of the army schools in India, and also into the training ships of her Majesty's Navy.—I am, &c., **WALTER MCLEOD.**
Royal Military Asylum, Chelsea, Feb. 9, 1869.

MEETINGS FOR THE ENSUING WEEK.

- MON.....**Society of Arts, 8. Cantor Lecture. Mr. S. A. Hart, R.A., "On Landscape Painting."
R. Geographical, 84. Staff-Commander J. E. Davis, R.N., "On Antarctic Discovery, and its connection with the Transit of Venus in 1882."
Actuaries, 7. Mr. Bailey, "On Rates of Premium for Foreign Travelling and Residence."
Medical, 8.
Victoria Inst., 8.
London Inst., 6.
Social Science Assoc. Mr. P. H. Holland, "Has the Drainage of Sewage into Rivers done more harm than the Drainage of Towns has done good?"
- TUES ...**Medical and Chirurgical, 84.
Civil Engineers, 8. 1. Discussion "On the Lagoons and Marshes of the Mediterranean." 2. Mr. Imrie Bell, "On Sinking Wells for the Foundations of the Piers of the Jumna Bridge, Delhi Railway." 3. Mr. John Milroy, "Description of Apparatus for Excavating the Interior of, and for Sinking Iron Cylinders."
Royal Inst., 3. Rev. F. W. Farrar, "On Comparative Philology."
Ethnological, 8. 1. Dr. Hooker, "On Ceremonies connected with Child-birth in Australia and New Zealand." 2. Don Alonzo Steffens, "On some Ethnological Remains found in the Pearl Islands of the Bay of Panama."
- WED ...**Society of Arts, 8. Dr. E. Smith, "On Ventilation."
Geological, 8. 1. Mr. W. Boyd Dawkins, "On the British Postglacial Mammalia." 2. Mr. J. W. Judd, "On the Origin of the Northampton Sands." 3. Mr. M. H. Coquand, "On the Cretaceous Strata of England, France, and Algeria." Communicated by Mr. J. W. Flower.
Archæological Assoc., 8.
- THUR ...**Royal, 84.
Antiquaries, 84.
Zoological, 84.
London Inst., 6.
Philosophical Club, 6.
Royal Inst., 3. Dr. John Harley, "On Respiration, and its Influence on the Action of the Heart."
Society of Fine Arts, 8. Second Conversazione of the Season, 9, Conduit-street.
- FRI**Royal Inst., 8. Dr. John Bridges, "On Civilisation and Public Health."
R. United Service Inst., 3. Mr. E. B. de Fonblanque, "Reforms in Military Administration."
- SATR. Botanic, 34.
Royal Inst., 3. Prof. Odling, "Hydrogen and its Analogues."**

Patents.

From Commissioners of Patents' Journal, February 12.

GRANTS OF PROVISIONAL PROTECTION.

Alkaline solutions, evaporating and calcining—318—W. I. Palmer and W. P. Goulding.
Animal substances, preserving—267—R. Jones.
Bankers' cheques, &c., printing—294—H. N. Nissen.
Basket-cars, vehicles known as—313—J. Proud.
Billiard tables, &c.—303—J. T. Bintlley.
Boilers—334—W. Maddick.
Bottles, &c., stoppers for—280—J. McDonald.
Carding engines—316—S. Brooke.
Carding engines, &c.—299—J. Tolson.
Carding machinery, &c., feed apparatus for—301—T. H. Kilner.
Cement—30—C. D. Abel.
Chlorine, &c., manufacturing—291—W. Weldon.
Ejector condensers—312—A. Barclay.
Engine slide bars, &c., grinding and polishing—274—J. Easterbrook, J. H. Allcard, and A. M. Wild.
File-cutting machines—297—E. T. Hughes.
File-planing machines—296—E. T. Hughes.
Fire-screens—311—C. Houtt.
Gaseous bodies, exhausting, &c.—289—T. Whimster.
Grain, hulling—285—A. M. Clark.
Holsts—309—J. A. A. Fontaine.
Horse collars—302—A. S. Andrews.
Horse-shoes—286—A. Mallard.
Ingots, casting—305—C. D. Abel.

Iron and steel—328—J. G. Willans.
Iron and steel piles, &c.—284—J. H. Johnson.
Iron, smelting, &c.—3248—I. Baggs.
Kilns for burning and drying bricks, &c.—320—J. Bird.
Lifting apparatus—307—J. A. Limbert.
Millstones, shaping—193—D. Rivenc.
Musical chair or seat—269—C. L. A. Hoelscher.
Oil paint—287—F. Jay.
Oils, &c., extracting from the substances in which they are contained—315—D. Joy.
Ovens—290—P. J. Wielemans.
Photographic pictures—336—J. R. Johnson.
Plough coulter—71—E. Gray.
Printing machinery—277—W. MacLean.
Printing surfaces, applying ink to—250—J. Gough.
Pumps, &c.—282—G. Hawksley.
Railway signals—300—G. H. Adam.
Railways—321—W. E. Newton.
Rotary engines—271—A. Browne.
Sewing machinery—338—A. V. Newton.
Sewing machines, apparatus for driving by electro-magnetism—288—T. E. Lundy and T. Hood.
Ships, &c.—279—T. W. Carter.
Ships, &c., propelling—278—J. Pickering.
Silvers, condensing—308—A. V. Newton.
Spade and shovel moulds—293—S. Taylor and G. W. Dyson.
Steam engines—298—R. Wood.
Stereotype matrices, machine for forming—306—T. G. Daw.
Tailors' shears and scissors—304—J. Whyte.
Taps or valves—281—S. Smith.
Tarpauling, &c.—275—N. C. Szerelmey.
Tops—322—H. Bate.
Vats, &c., measuring and drawing off liquid from—328—J. H. Tyrrel.
Ventilators and chimney-pots—276—G. Hawksley.
Vessels for containing hot liquids—324—V. Baker.
Water-closets, &c., regulating the flow of water in—314—N. Voice.
Window fastenings—283—G. Price.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Furnaces and pans for the recovery of the soda from the waste lyas resulting from the boiling of esparto grass, &c.—375—C. D. J. Seitz.
Furnaces, blower for—402—B. F. Sturtevant.
Lasts, machine for making—335—R. R. Frohock.

PATENTS SEALED.

2544. G. Nelson.	2575. J. G. Tongue.
2547. J. Macintosh.	2580. J. Landless.
2551. R. Robinson and G. D. Edmeston.	2582. L. Gay.
2554. H. Y. D. Scott.	2586. J. H. Atterbury.
2558. W. B. Lspeut.	2593. W. J. Almond.
2559. W. J. Hinde.	2671. R. Saunders.
2560. A. Smith.	2687. T. Lester and W. Trueman.
2568. G. F. Bradbury and T. Chadwick.	2688. J. Fieldhouse.
2572. H. J. Behrens and E. Dart.	2722. E. L. Parker.
	3415. J. Hickisson.
	3594. J. Bourne.

From Commissioners of Patents' Journal, February 16.

PATENTS SEALED.

2577. J. S. Starnes.	2644. J. H. Johnson.
2578. P. R. and W. Hodge.	2645. A. M. Clark.
2583. W. Thomson.	2651. W. Hall.
2594. J. Sawyer.	2686. J. Greenwood.
2598. A. Rollason.	2696. J. C. Martin.
2602. T. Haigh.	2733. W. E. Newton.
2607. F. J. Knewstubb.	2750. U. A. Masselon.
2609. J. L. Clark.	2768. E. Cottam.
2611. D. Evans.	2780. A. V. Newton.
2615. W. J. & C. A. Kesselmeyer.	2782. G. Davies.
2623. W. Chorlton.	2798. B. Dobson and W. Slater.
2625. G. Tidcombe.	2808. G. Bower & W. Hollinshead.
2629. O. C. Setcheil.	3149. W. Lorberg.
2642. J. J. Long.	3377. M. A. F. Mennons.
2643. J. Gillott and P. Copley.	3757. W. G. Manwaring.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

559. W. Tongue.	455. J. Vero.
424. J. and H. Charlton.	473. H. E. Newton.
445. W. Young.	479. T. Adams and G. J. Parson.
483. A. H. Hassall.	486. A. V. Newton.
501. J. H. Whitehead.	1853. R. Clough and P. Smith, sen.
433. W. F. Cooke & G. Hunter.	
457. W. R. Lake.	463. F. R. Wheeldon.
69. G. T. Bousfield.	475. W. N. Wilson.
434. C. D. Abel.	485. G. Bedson.
571. R. Leake and J. Beckett.	487. C. Gall.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

392. E. Green and J. Newman.	472. J. Kirkwood.
361. J. J. McComb.	736. W. Barford.
384. T. Davison.	408. C. Turner and J. Shaw.
390. E. E. Allen and J. Stewart.	537. J. Tangye.